

LOS  SAN

**LOS ANGELES -TO-SAN DIEGO  
PROPOSED RAIL CORRIDOR IMPROVEMENTS STUDIES**

**LOSSAN Corridor  
DRAFT Strategic Plan**

*April 2003*

*Prepared for:*



**California Department of  
Transportation**



**U.S. Department of  
Transportation Federal  
Railroad Administration**

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EXHIBIT 8-1     TIMELINE OF LOSSAN CORRIDOR RAIL IMPROVEMENT PROJECTS .....	between pages 68 & 69
EXHIBIT 8-2     RELATIVE COSTS/PERFORMANCE IMPACTS AND BENEFITS OF LOSSAN CORRIDOR RAIL IMPROVEMENT PROJECTS.....	between pages 68 & 69

## 1.0 EXECUTIVE SUMMARY

The LOSSAN (Los Angeles to San Diego and San Luis Obispo) Rail Corridor is one of the busiest, most important rail lines in the United States, and serves a vital function in providing intercity and commuter rail services within and between cities in California's most populous counties. The area of the LOSSAN corridor studied in the Department's Proposed Rail Corridor Improvement Studies and this document, however, is that portion of the corridor between Los Angeles Union Station and San Diego Santa Fe Depot; hereafter, use of the term "LOSSAN" will refer to that segment only.

The California Department of Transportation (the Department) has determined that the creation of a Strategic Plan is an important and beneficial adjunct to its ongoing Program EIR/EIS (PEIR/PEIS) process recommending conventional rail improvements for the LOSSAN corridor. This complementary planning document looks at the proposed rail improvements from a corridor-wide perspective. In supporting the PEIR/PEIS work underway, the Strategic Plan's objectives are:

- To provide an additional opportunity for public outreach, beyond that provided as part of PEIR/EIS process
- To foster better communication and understanding among stakeholders at all levels
- To provide an opportunity to screen out design options at key locations, so as to focus future work on the most promising alternatives
- To develop short and long-term visions for the corridor, contemplating a program of projects for the next twenty years.

The Strategic Plan met these objectives through a series of public workshops held in cities along the corridor. Five Public Workshops were held. The workshops provided the public with an overview of the corridor and the rail improvements under study, including information on:

- The purpose and goals of the Strategic Plan
- The need for improvements to the corridor
- Current and projected weekday train volumes
- Corridor facts, including rail owners and operators and details on Freight services
- Types of services provided (Intercity Rail, Commuter Rail, and Freight)
- The Strategic Plan timetable
- Ranges of costs, rail performance issues, and community/environmental issues of projects throughout the corridor
- Design options and alternatives at four key locations along the corridor where the range of options was sufficiently broad to allow the screening out of some options, the recommendations for screening, and the rationale and criteria used to reach the recommended screening decisions.

- The Planning Process, including timelines for the completion of the Strategic Plan, and the Department's Draft Program-level Environmental Impact Reports/Environmental Impact Statement.

In addition to the public workshops, meetings were held with corridor cities as well as working groups consisting of transportation agencies and other stakeholders, resource agencies, rail operators, and partners Federal Railroad Administration (FRA)<sup>1</sup> and the California High-Speed Rail Authority (Authority)<sup>2</sup>. These meetings helped to foster the sense of understanding regarding the corridor, its current and future needs, and how the proposed improvements could not only meet train service and performance goals, but could offer solutions to long-standing issues of community and environmental concern.

Through the consultative process used in the development of the Strategic Plan, new alternatives were presented by the South Orange County Rail Working Group, leading to possible design options.

Screening of design options at key locations – Del Mar, Encinitas, San Clemente/Dana Point, and San Juan Capistrano – as well as evaluation of whether or not to conduct an Inland Bypass Alternative Study are other products of this Strategic Plan process.

Recommendations from the screening process include:

- In Del Mar, eliminate the option of double-tracking in the existing corridor along the Coastal Bluffs, and continue to evaluate relocating the rail corridor into one of two tunnel options
- In Encinitas, eliminate the option of lowering the existing alignment into a long trench throughout the length of the city, and continue to evaluate either at-grade double-tracking with grade separations at major intersections, or constructing a short trench that would provide the same benefits as a long trench at a greatly reduced cost
- In San Clemente, eliminate options of double-tracking in the existing rail corridor along the beach, and continue evaluating relocation of the rail lines from beaches and the city's Pier Bowl area into a tunnel
- In San Juan Capistrano, eliminate the option of double-tracking in the existing rail alignment located close to significant community and historical resources, and continue evaluating both an at-grade/trench option and a tunnel option
- Eliminate from further consideration an Inland Bypass Alternative in South Orange County, due to fundamental concerns regarding constructability, and severe impacts to the environment, cost, system performance and operations.

Finally, the Strategic Plan provides the opportunity to discuss a program of projects as part of addressing the corridor's future infrastructure and service needs. The Strategic Business Plan, through its evaluation of the relative merits of each project – the costs, benefits, and any potential issues and impacts – has created a program of projects. The Strategic Plan is a tool that can be used by policymakers to identify and prioritize the

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<sup>1</sup> The Federal Railroad Administration is the federal lead agency for both the Department and Authority's Program EIR/EIS processes. FRA is also involved in administering federal funding to and supporting the development of policy regarding the nation's existing intercity passenger rail systems.

<sup>2</sup> The Authority is partnering with the Department in its examination of the LOSSAN corridor. The Authority is in the final process of developing an EIR/EIS for its statewide high-speed rail system. While this electrified, grade-separated system might run as far south as either Anaheim or Irvine, the corridor is important to the Authority in its role as a feeder network to the statewide system, and the improvements proposed would strengthen the corridor's ability to serve that role.

order in which rail improvement projects should (subject to availability of funding) move to the next steps of:

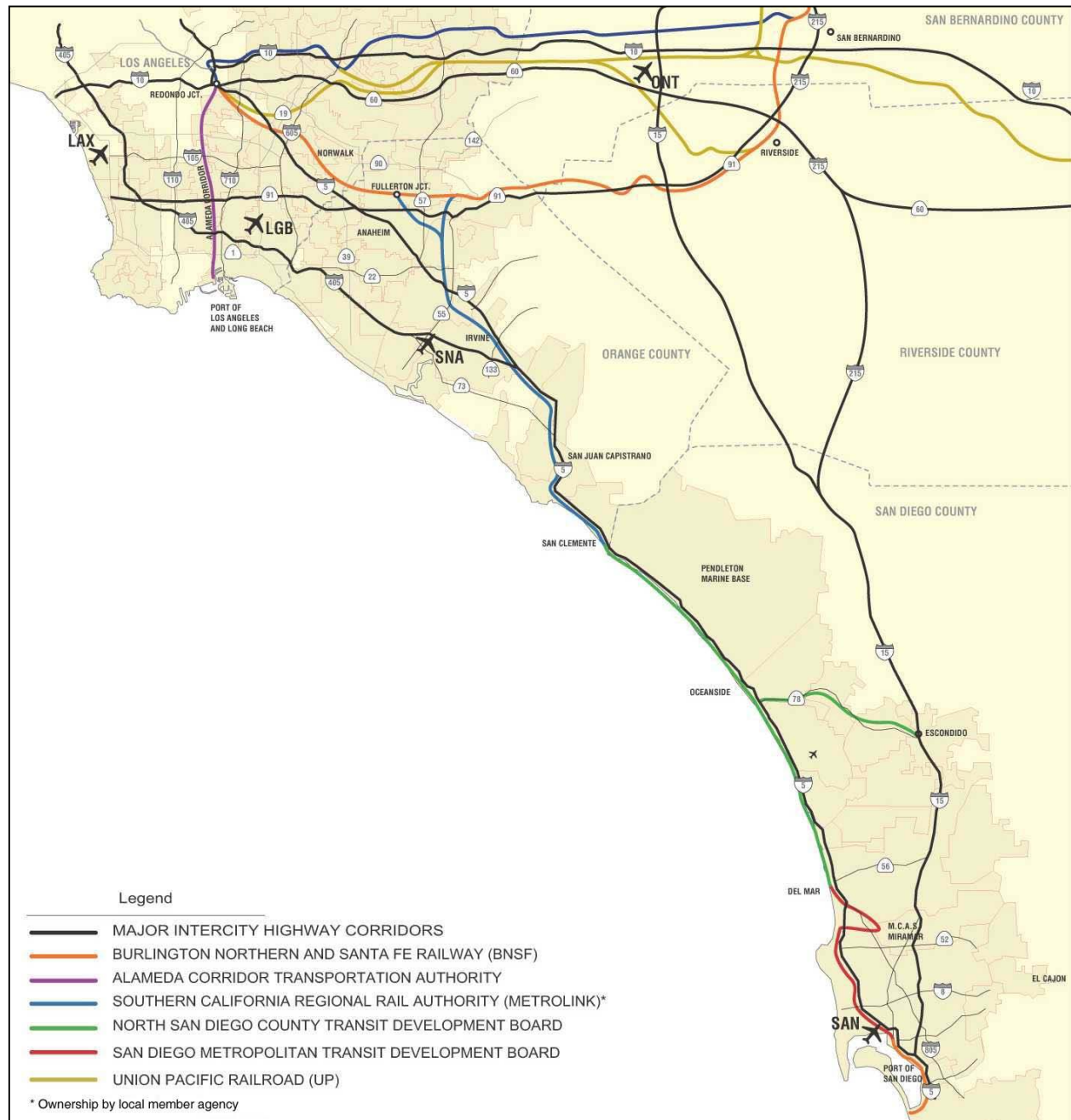
- Identifying and programming projects for future funding, and securing local or regional matching funds
- Securing project-specific environmental clearance
- Performing preliminary engineering
- Completing the project's final design
- Obtaining the necessary permits, and
- Constructing the corridor improvements.

As part of the information gathered in the Strategic Plan, a draft timeline and schedule for the recommended rail improvement projects was created. This draft timeline is the result of collaboration with the public, cities along the corridor, transportation agencies and rail operators, as well as the Department, the Authority, and FRA. The result is a "plan of action" for improvements to the LOSSAN corridor over the short term (the next three years), the medium-term (4-6 years from now), and the long-term (7 years and beyond). The time periods mentioned are measured following the final release of the PEIR/PEIS. As well, a listing of the projects, their relative costs, the impacts and benefits to train performance, and community and environmental issues associated with each was created, and is included as Exhibit Executive Summary 1 (following page).

The Strategic Plan process has yielded an important benefit to the PEIR/PEIS process, saving time, energy and resources, advancing the timeline for completion of the environmental review process, and creating a document which will be useful not only as a planning tool, but one which can be used by Planning Agencies in making funding applications and in making programming decisions regarding rail projects in their respective areas.



## 2.0 INTRODUCTION AND BACKGROUND



**Figure 2-1 – Southern California Intercity Transportation Network**

This figure shows the 127.5-mile portion of the LOSSAN corridor stretching from Los Angeles Union Station south to San Diego's Santa Fe Depot. Figure 2-1 above also shows ownership information for this segment of the rail corridor, as well as other important elements of Southern California's Transportation Network, including major highways and airports within the metropolitan areas.

## Introduction

For the past two years, the California Department of Transportation (the Department), has been studying a series of improvements to the Los Angeles to San Diego and San Luis Obispo (LOSSAN) rail corridor, used by Amtrak, Metrolink, Coaster and the Burlington Northern and Santa Fe Railway (BNSF). The area of the LOSSAN corridor studied in the Department's Proposed Rail Corridor Improvement Studies and this document, however, is that portion of the corridor between Los Angeles Union Station and San Diego Santa Fe Depot; hereafter, use of the term "LOSSAN" will refer to that segment only. The studies are being done in cooperation with the California High-Speed Rail Authority (the Authority) and the Federal Railroad Administration (FRA).

FRA is the federal lead agency, under the terms of the National Environmental Policy Act (NEPA), for these collaborative studies. FRA's Office of Railroad Development oversees federal investment, development and implementation of Administration policy regarding intercity rail passenger service. The programmatic nature of the Department's study would allow improvements and projects with "corridor-wide utility" to be eligible for Federal funding. Future project-specific environmental documents could be tiered from the Department's program-level EIR/EIS, but would retain their eligibility for Federal funding through their association with the original document.

The State of California, through the Department's Division of Rail, supports three Amtrak intercity passenger rail services, including the LOSSAN corridor's Pacific Surfliner. The Department provides funding and planning assistance for these routes, including operating and capital grants for station and equipment improvements. Its Program-level EIR/EIS will identify incremental improvements on the corridor.

For this project, the Department is both the project sponsor and the lead agency for purposes of the California Environmental Quality Act (CEQA) requirements. The Department has determined that a Program EIR is the appropriate document for the project at this conceptual stage of planning and decision-making, which would involve defining and evaluating incremental improvements, alternative corridors, station improvements, and phasing options.

## Why A Strategic Plan?

The Department has determined that the creation of a Strategic Plan for the LOSSAN Corridor is an important, beneficial, and complementary adjunct to its ongoing Program EIR/EIS process. The purposes of the Strategic Plan include:

- To provide an additional opportunity for public outreach, beyond that provided as part of PEIR/EIS process
- To foster better communication and understanding among stakeholders at all levels
- To provide an opportunity to screen out design options at key locations, so as to focus the Program EIR/EIS on the most promising alternatives
- To develop short and long-term visions for the corridor, contemplating a program of projects for the next twenty years.

This document has been structured to address these objectives.



## A Constructive Dialogue

There are formal Scoping periods associated with an EIR/EIS process. During these periods, public meetings are held and the public has an opportunity to comment on the process and the alternatives to be studied. However, once the Scoping period has closed, it is not reopened, and normally the next opportunity to comment would be during the formal comment period, following the release of the Draft PEIR/EIS. There was an expressed interest on the part of some of public and communities located along the corridor, particularly in some of the key locations where screening recommendations were under consideration, that they be given additional opportunities to comment and to be involved in the planning of LOSSAN rail improvements, above and beyond those provided in the Program-level EIR/EIS process – and before release of the Draft PEIR/EIS. The Strategic Plan, and the public workshops held during its preparation facilitated an additional opportunity for the public to review and comment on the proposed improvements, as well as on the recommendations for eliminating some options from further evaluation.

There are some significant differences among the various design options under consideration in the LOSSAN corridor study, and community and environmental impacts associated with each. The Strategic Plan process provided information pertaining to the corridor and solicited input from the public and resource agencies in advance of the Draft PEIR/EIS.

Working Group meetings held during the development of the Strategic Plan provided continuing communication and interaction between the Department, the Authority, the consultant team, the directly affected cities, transportation agencies and other stakeholders. Representatives also met with individual cities along the corridor as needed. As well, the public workshops conducted helped to educate and inform the public about the corridor, the rail operators and services provided, the proposed improvement projects, and those options recommended for elimination.

The strong interactive process used in the Strategic Plan contributed to an increased understanding among stakeholders at all levels and to a better understanding about the LOSSAN corridor today, what is needed for the future of the corridor, and how these future needs could best be met. Sections 3, 4, and 5 summarize key facts about the LOSSAN corridor.

## Focusing Our Efforts

The second purpose behind the Strategic Plan is to make recommendations for screening of design options at key locations along the corridor. This screening will save time, effort, and resources that would be otherwise required to study alternatives that are later determined to be infeasible and inferior to other alternatives. The Department's internal review and acceptance of the Strategic Plan following the receipt of comments from agencies and the public, will document its acceptance of the screening recommendations. The locations, options, recommendations and underlying rationale behind the recommendations are detailed in Section 6, while Section 7 reviews public and agency comments on the screening recommendations and on the Strategic Plan in general.

### **Developing A Vision**

The development of a program of projects is part of addressing the corridor's future infrastructure and service needs. The Strategic Plan, through its evaluation of the relative merits of each project (the costs, benefits, and any potential issues and impacts) has created a program of projects. The Strategic Plan is a tool that can be used by policymakers to identify and prioritize the order in which rail improvement projects should move to the next steps of:

- Identifying and programming projects for future funding, and securing local or regional matching funds
- Securing project-specific environmental clearance
- Performing preliminary engineering
- Obtaining the necessary permits
- Completing of the project's final design, and
- Constructing corridor improvements.

As part of the information gathered in the Strategic Plan, a draft timeline and schedule for the recommended rail improvement projects was created. This draft timeline is the result of collaboration with the public, cities along the corridor, transportation agencies and rail operators, as well as the Department, the Authority, and FRA. The result is a "plan of action" for improvements to the LOSSAN corridor over the short term (the next three years), the medium-term (4-6 years from now), and the long-term (7 years and beyond). The timeline, and next steps, are discussed in Sections 8 and 9.

### 3.0 OVERVIEW OF THE LOSSAN CORRIDOR

The LOSSAN (Los Angeles to San Diego) Rail Corridor provides rail access between the most populated counties in California: Los Angeles, Orange, and San Diego. This 127.5-mile rail corridor carries intercity passenger rail service, commuter rail service, and freight. In this section, an overview of the corridor is provided, including information on the cities along the route, the surrounding land uses, existing stations (and those under construction), and the rail services in those areas.

The LOSSAN corridor is one of the busiest rail corridors in the United States, and a major transportation resource in Southern California. The Pacific Surfliner intercity passenger rail service, provided by Amtrak and sponsored by the California Department of Transportation (one of three Intercity Passenger Rail services so supported by the Department, as shown in Figure 3.1), is the second most-heavily traveled passenger rail corridor (outside of the Northeast Corridor between Washington D.C. and Boston). The LOSSAN corridor is the only rail link between Los Angeles and San Diego.

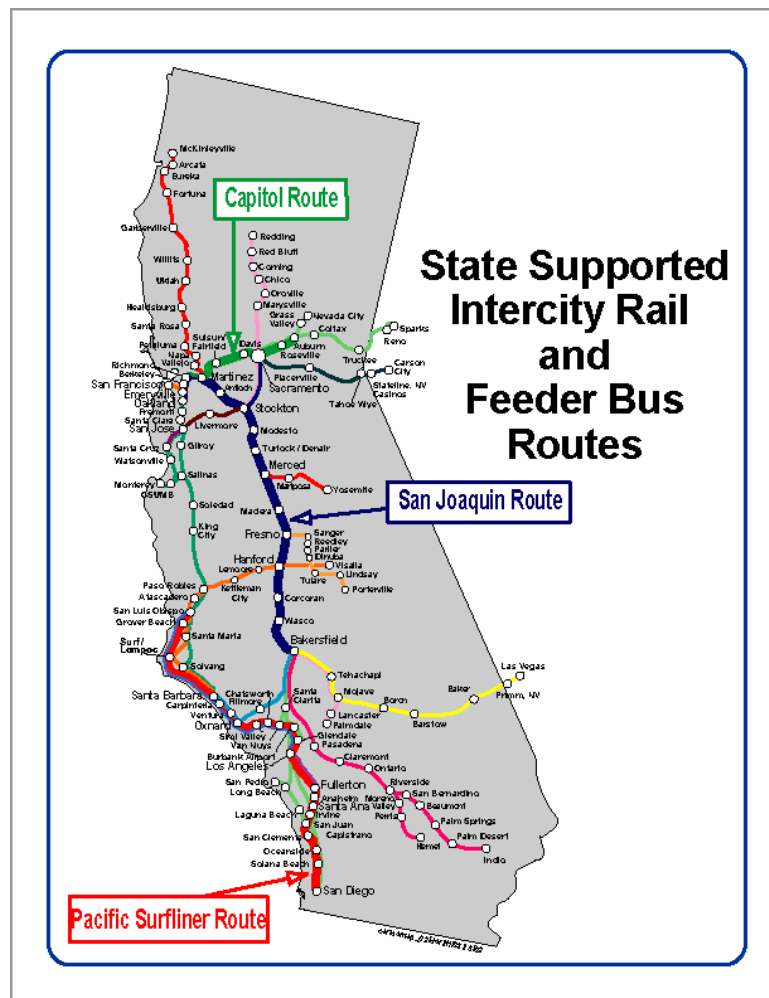


Figure 3-1 – Map of Intercity Rail Services Supported by the Department

Until 1992, BNSF's predecessor, the Atchison, Topeka & Santa Fe Railroad, owned the LOSSAN rail corridor. In that year, the rail right-of-way (excluding the segment between Redondo and Fullerton Junctions) was sold to the Southern California transportation agencies in the counties through which the rails pass. As part of the sale, BNSF retained the right in perpetuity to use the railroads to provide freight service to its customers. As shown in Exhibit 3-1, the corridor has a variety of owners, including:

- In Los Angeles County, the Los Angeles County Metropolitan Transportation Authority and BNSF
- In Orange County, Orange County Transportation Authority
- In San Diego County, the North San Diego County Transit Development Board (from Oceanside to near SR-52) and the San Diego Metropolitan Transit Development Board (from SR-52 south)

There is tremendous variation in the nature of the built and natural environments along the LOSSAN corridor between San Diego and Los Angeles. The following subsections describe the communities along the rail corridor, existing rail stations (both serving Amtrak intercity rail and commuter rail), and the land uses surrounding the corridor as it passes through:

- Los Angeles County
- Orange County
- San Diego County

### **3.1.1 Los Angeles County**

In Los Angeles County, the built environment is very urbanized. From Los Angeles Union Station south, the LOSSAN corridor is surrounded by predominantly industrial, light industrial, freight yards and rail operations, with adjacent residential communities becoming more frequent further south and east.

In Los Angeles County the LOSSAN corridor passes through the cities and communities of:

- Los Angeles
- Vernon
- Commerce
- Montebello
- Pico Rivera
- Santa Fe Springs
- Norwalk
- La Mirada

Current services that operate along the corridor in Los Angeles County include Amtrak Intercity Passenger Rail service, Metrolink Commuter Rail service, and BNSF Freight Rail service.

**Stations**

Stations currently served along this segment of the LOSSAN corridor by both intercity and commuter service include:

- Los Angeles Union Station
- Norwalk/Santa Fe Springs Metrolink Station

### **3.1.2 Orange County**

As the rail corridor moves south into Orange County, the character of the surrounding uses continues to change, with commercial/light industrial uses giving way to residential uses.

Current services that operate along the corridor in Orange County include Amtrak Intercity Passenger Rail service, Metrolink Commuter Rail service, and BNSF Freight Rail service.

#### **North Orange County**

As the LOSSAN corridor crosses into North Orange County, the land uses remain a mixture of commercial/light industrial, with increasing concentrations of adjacent residential neighborhoods, especially in North Orange County's older communities, which grew up around the rail line. In Anaheim, the corridor skirts Edison Field, and in Santa Ana, passes near the downtown area.

In North Orange County, the LOSSAN Corridor passes through the cities of:

- Buena Park
- Fullerton
- Anaheim
- Orange
- Santa Ana
- Tustin

#### **Stations**

North Orange County stations along the LOSSAN corridor include:

- Fullerton Transportation Center (Amtrak and Metrolink)
- Anaheim Transportation Center (Amtrak and Metrolink)
- Orange Transportation Center (Metrolink only)
- Santa Ana Regional Transportation Center (Amtrak and Metrolink)
- Tustin Metrolink Station (Metrolink only)

A Buena Park Metrolink station is currently under construction.



**South Orange County**

The adjacent land uses in South Orange County are largely residential in character, along with some commercial/light industrial developments, parcels of open space, and agricultural properties. The LOSSAN corridor travels through the center of San Juan Capistrano, and at Dana Point begins a short segment that runs directly along the coastline in the cities of Dana Point and San Clemente.

**Communities**

In South Orange County, the LOSSAN Corridor passes through quite a few cities including:

- Irvine
- Lake Forest
- Mission Viejo
- Laguna Hills
- Laguna Niguel
- San Juan Capistrano
- Dana Point
- San Clemente

**Stations**

Stations in the South Orange County segment of the LOSSAN corridor include:

- Irvine Transportation Center (Amtrak and Metrolink)
- Mission Viejo/Laguna Niguel Metrolink Station (Metrolink only)
- San Juan Capistrano Depot (Amtrak and Metrolink)
- San Clemente Metrolink Station (Metrolink only)
- San Clemente Pier (Seasonal Amtrak service only)

### 3.1.3 San Diego County

Throughout San Diego County, the LOSSAN corridor remains close to the coast, and passes directly through many of the county's coastal communities. Land uses in the north of San Diego County consist of the vast Marine Corps Base Camp Pendleton, and then transition to coastal communities, with a blend of commercial, light industrial, and residential uses.

In North San Diego County, the LOSSAN Corridor passes through the cities of:

- Oceanside
- Carlsbad
- Encinitas (including the communities of Leucadia and Cardiff-by-the-Sea)
- Solana Beach
- Del Mar
- The City of San Diego communities of Sorrento Valley, Miramar, University City, Clairemont, Bay Park, Old Town, Middletown, and Centre City.

Current services that operate along the corridor in San Diego County include Amtrak Intercity Passenger Rail service, Metrolink and Coaster Commuter Rail services, and BNSF Freight Rail service.

#### Stations

Stations along this segment of the LOSSAN corridor include:

- Oceanside Transportation Center (Amtrak, Metrolink, and Coaster)
- Downtown Carlsbad (Coaster only)
- Carlsbad Poinsettia Station (Coaster only)
- Downtown Encinitas (Coaster only)
- Solana Beach Station (Amtrak, Coaster)
- Sorrento Valley Coaster Station (Coaster only)
- Nobel Drive Coaster Station (Coaster only) – under construction, opening 2004
- Old Town Transit Center (Coaster only)
- Santa Fe Depot (Amtrak and Coaster)

## 4.0 RAIL SERVICES ALONG THE LOSSAN CORRIDOR

There are three major categories of rail services provided on the LOSSAN corridor, Intercity Passenger Rail, Commuter Rail, and Freight Rail. The following sections provide a description of each, as well as information on the equipment used, numbers of trains per day, and assessments of future service levels.

### 4.1 Intercity Passenger Rail



#### Description

Intercity Passenger Rail service offers travelers a convenient way to move between major metropolitan areas, and is an alternative to the automobile, bus, or airplane. In the LOSSAN Corridor, intercity passenger rail service is provided by Amtrak's *Pacific Surfliner* service. Amtrak operates this service with significant operational and capital funding support from the Department.

#### Statistics

##### Equipment used

The *Pacific Surfliner* operates with some of the newest, state-of-the-art rail equipment in America – its locomotives are F59PHI “California” locomotives, manufactured by General Motors, operating the cleanest-burning diesel engines available, and streamlined to reduce wind resistance.

*Pacific Surfliner* coaches are an Amtrak “Superliner” variation of the bi-level California Cars used on the other two Department-sponsored intercity rail routes (the Capitol and the San Joaquin).

##### Current operational levels

The *Pacific Surfliner* runs 365 days a year, with at least eleven trains in each direction daily (and additional service – 13 northbound trains and 12 southbound trains – provided on weekends and holidays), for total of between 22 and 25 trains each day.

##### Planned Operational Levels

Amtrak's California Passenger Rail System Improvement Plan Technical Report (March 2001), calls for hourly *Pacific Surfliner* service on the corridor by 2020. This increase in service would be implemented incrementally – from the current 11 daily roundtrips to 14 (by 2006), and ultimately to 16 (by 2020).

The major challenge to this ability to provide additional service is the insufficient main line track necessary to support this level of service.

**Ridership (current and projected)**

The Pacific Surfliner currently carries more than 1.5 million passengers a year. Projected yearly ridership is forecast to rise in the near term (2006) to 3.3 million passengers, and by 2020 to 5.76 million passengers.

## **4.2 Commuter Rail**

Commuter Rail service is primarily designed to meet the work travel needs of daily commuters. Consequently, the service operates primarily Monday through Friday during peak commute hours, with the bulk of trains traveling in the primary commute direction. Limited evening and weekend services may be provided. Commuter Rail service on the LOSSAN Corridor is provided by two different services: Metrolink and Coaster.

### **4.2.1 Metrolink**



#### **Description**

Metrolink is the name for the commuter rail service provided by the Southern California Regional Rail Authority (SCRRA). SCRRA is a Joint Powers Authority formed by Los Angeles, Ventura, Orange, San Bernardino, and Riverside counties in 1991, to create and operate a regional passenger rail network within its five-county area. Within the LOSSAN Corridor, Metrolink operates between Los Angeles Union Station and Oceanside Transit Center.

Metrolink headways vary between one half hour to 3 hours, depending on the direction of operation, time of day, and the segment of the corridor in which the train is operating. Metrolink operates Monday through Friday, with no weekend service.

#### **Statistics**

**Equipment used**

Similar to Amtrak's Pacific Surfliner, Metrolink operates F59PH and F59PHI "California" locomotives, both manufactured by General Motors.

Passenger cars used by Metrolink are Bi-level Commuter Coaches manufactured by Bombardier.

**Current operational levels**

Currently, Metrolink provides a range of service levels along the LOSSAN corridor, including:

- 28 trains each weekday between Los Angeles Union Station and the Fullerton Transportation Center in North Orange County
- 31 trains between the Fullerton Transportation Center and the Irvine Transportation Center
- 19 trains between Irvine and San Juan Capistrano, and
- 12 trains operate as far south as Oceanside in North San Diego County.

**Planned operational levels**

Recent forecast data provided by Metrolink for the year 2020 project up to 54 trains operating between Los Angeles Union Station and Irvine, up to 22 trains between Irvine and San Juan Capistrano, and 17 trains south of San Juan Capistrano.

**Ridership**

Metrolink's most recent ridership numbers indicate that it carries 8,705 passengers on its Orange County and Inland Empire to Orange County lines each weekday.

**4.2.2 Coaster**



**Description**

The commuter rail service in San Diego County is "The Coaster", operated by North County Transit District (NCTD). Coaster provides service between Oceanside and San Diego, at headways similar to those of Metrolink.

**Statistics**

**Equipment used**

NCTD's Coaster commuter service currently uses modified F40PHM and F59PHI ("California") locomotives, both manufactured by General Motors.

As with Metrolink, passenger cars used by Coaster are Bi-level Commuter Coaches manufactured by Bombardier.

*Current operational levels*

The Coaster operates 22 trains a day between the Oceanside Transportation Center and Santa Fe Depot in downtown San Diego, at headways similar to those of Metrolink. Currently, 4 trains operate each Saturday with headways of approximately 2 to 3 hours in each direction.

*Planned operational levels*

Coaster commuter operations by 2020 are expected to increase to 54 trains each weekday between Oceanside and San Diego with an expected increase in weekend service as well.

*Ridership*

Most recent numbers for Coaster (April 2003) show average weekday ridership of 5,179.



### 4.3 Freight Service



#### Description

The Burlington Northern and Santa Fe (BNSF) Railway (which owns the rail line from Los Angeles to Fullerton) provides freight service on the LOSSAN corridor. That portion of the LOSSAN corridor is part of BNSF's primary intercontinental corridor from the Ports of Los Angeles and Long Beach to all of North America. However, the majority of these trains continue east past Fullerton towards the Inland Empire.

The Burlington Northern & Santa Fe Railway (BNSF) is the sole freight rail operator between Los Angeles, Orange County and San Diego. Currently, BNSF has no active customers between Del Mar and Oceanside. In North San Diego County, the only regular customer serviced by the BNSF is the Marine Corps Base at Camp Pendleton. Freight service within this corridor is focused in the following three areas:

- Auto Transload Service in San Diego
- Lumber, Fly Ash, and Cement
- Local Freight Service (Service to Escondido and Miramar)

#### Statistics

##### Equipment Used

BNSF service along the LOSSAN rail corridor uses several different locomotive types depending on the freight service necessary. Standard locomotives used along the corridor can include Dash 8-40CW's and Dash 9-44CW's manufactured by GE and among the newest class of engines purchased by the BNSF, and General Motors built SD9's, GP10's, GP35's and GP38-2's.

Standard freight rail equipment is used along the corridor consisting of box, hopper, flat and tank cars, gondolas and auto cars.

##### Current operational levels

BNSF information provided shows the railway currently operates 6 to 8 freight trains along the length of the rail corridor from Los Angeles to San Diego within a 24-hour period each day.

### Planned operational levels

Future service along the corridor segment from Fullerton to San Diego is not expected to increase beyond 9 to 12 trains within a 24-hour time period by 2020, regardless of improvements along the existing rail corridor, according to recent forecasts developed by the Los Angeles Economic Development Council (BNSF does not provide public information regarding future operational projections.)

## **Freight Issues**

Concerns about freight traffic make up a substantial number of the questions asked at public meetings. On the LOSSAN Corridor, freight traffic forms just a small portion of the total number of trains, now and in projections of daily train volumes for 2020.

The following subsection provides background information on freight issues as they relate to the LOSSAN corridor, including:

- Continuing Railroad Ownership of part of LOSSAN corridor
- BNSF Freight Operations
- Constraints on Rail Operations
- Concerns regarding the Port of Ensenada (Mexico)

As noted in Section 3.0, BNSF continues to own a segment of the LOSSAN Corridor, from Redondo Junction in Los Angeles to Fullerton Junction in North Orange County. This portion is part of BNSF's transcontinental system, and much of the nation's rail traffic passes through here, on its way from the Ports of Los Angeles and Long Beach to the rest of the country (by way of the Inland Empire).

Only a small number of the average 45 daily BNSF freight trains – between six and eight – move between Los Angeles and San Diego. These trains serve local customers along the way, and are used for bulk goods movement and the transfer of automobiles from the Port of San Diego. By 2020, it is forecast that prevailing economic conditions would likely increase the daily number of trains to between nine and 12.

The largest constraint on freight rail operations within the corridor is the shared-use agreement BNSF has between Metrolink in Orange County and Coaster in San Diego County, negotiated as part of the sale of the corridor in 1992. The shared-use agreement states that commuter and intercity trains shall be dispatched with first priority over any BNSF train. The agreement also established a "restricted freight period" during peak commuter hours in which BNSF trains, unless otherwise authorized, may not operate along the mainline.

There has been concern that expansion of cargo-handling facilities at Mexico's Port of Ensenada might result in an increase in freight train levels on the LOSSAN corridor. No freight trains currently travel between the Port of Ensenada and the United States, as no rail corridor currently exists. Mexico's own national rail plan indicates that future rail freight service from Ensenada would head east, connecting to an existing rail corridor, the San Diego and Eastern Railroad, from which the freight traffic would move further east.

## 5.0 PURPOSE AND NEED FOR IMPROVEMENTS TO THE LOSSAN CORRIDOR

The Program level EIR/EIS Purpose and Need Statement details the major purposes of and need for improvements to the LOSSAN corridor. These are summarized below, as additional background.

***Reduce running times*** – Delays associated with operating on a single track (including waiting at sidings) as well as speed restrictions adversely affect existing running times in the LOSSAN corridor. The addition of double-tracking, as well as the grade separations, trenches and tunnels proposed in this study would greatly reduce running times for trains. The elimination of these delays would benefit current intercity passenger rail travelers and attract new passengers. Reduced running times would also benefit the two commuter rail operations on the corridor, Metrolink and Coaster.

***Increase capacity on existing routes*** – As the corridor is largely single-tracked, there are a finite number of trains that can be operated safely, limiting the capacity of existing service. Only one train can be in a single-tracked section at a time, requiring trains at either end of the single-tracked section to wait for the first train to pass before they can proceed. Consequently only so many trains can operate along the route at one time. The double tracking included in the proposed improvements would allow for additional trains to operate simultaneously, and no train would have to wait at sidings. This would provide additional train/passenger-carrying capacity along the existing routes for all operators.

***Increase cost-effectiveness*** – The proposed improvements to the LOSSAN corridor would greatly reduce the trip time between cities along the line, making intercity passenger rail a more attractive travel option, and allowing for additional daily trips. The reduced travel time would help attract new passengers to the service. Increased ridership of the Pacific Surfliner service would improve the cost-effectiveness of the Department's support by lowering the operating subsidy per passenger, and freeing up funds to be used for other purposes, such as equipment, station (and station area) improvements. These travel time improvements would also greatly benefit the two commuter rail operations on the corridor, Metrolink and Coaster.

***Improve Safety*** – Safety is a primary consideration of intercity passenger rail systems, both for the passengers, crew and the train, as well as for pedestrians, drivers and vehicles who interact with the rail corridor at roadway and pedestrian crossings. The proposed improvements would provide for improved safety along the rail corridor, eliminating many at-grade crossings and establishing new pedestrian crossings. Additionally, tunnels and trenches in some areas would reduce the interaction between pedestrians, vehicles and trains, especially in key locations such as along the Del Mar Bluffs, in Encinitas, along the beach and bluffs in the cities of San Clemente and Dana Point, and in the downtown area of San Juan Capistrano.

***Improved transportation options for youth, the elderly, and the disabled*** – An additional benefit of the proposed improvements to the LOSSAN corridor is that the enhanced rail service resulting from the projects in the study would improve intercity transportation options for those who do not, or cannot operate an automobile, including youth, the elderly, and the disabled.

***Provide for greater links between transportation modes*** – The improvements proposed in this study would allow for the construction and improvement of stations along the corridor, including the potential construction of new stations in San Diego (at University Towne Centre), San Clemente, and San Juan Capistrano. These facilities would be multi-modal, serving not just intercity passenger rail, but commuter rail, and local and regional transit service. The rail improvements proposed would provide for greater integration of transportation modes, and the improved service (increased frequency and reduced travel times) creates an opportunity for local communities and regional transit operators to coordinate bus service with train arrivals/departures. As well, linkages between emerging areas of population growth (especially in South Orange County and North San Diego County) and major employment centers would be strengthened.

The need for improvements within the LOSSAN corridor is demonstrated by Southern California's insufficient capacity to meeting existing and future demand in the corridor along with air quality concerns, reduced reliability, and increased travel times due to the associated congestion. The interstate highway system and the existing passenger rail system serving the intercity travel market are currently operating at or near capacity. This intercity rail system has not been keeping pace with the tremendous increase in population and tourism in the state. Simply stated, the need for improvements to the corridor relates to:

- Future growth in travel demand for passenger trips between Los Angeles, Orange and San Diego Counties
- Rail capacity constraints resulting in congestion and travel delays
- Unreliability of travel stemming from congestion, delays, weather conditions, accidents and other factors
- Accidents on intercity highways and railways in congested travel corridors, and the potential for accidents at at-grade crossings as highway and rail traffic volumes increase
- Continuing air quality issues
- Pressures on natural resources and habitats from highway construction, motor vehicle use and congestion

The LOSSAN Corridor Strategic Plan assists in meeting these needs by laying out a vision and plan for the improvement of the LOSSAN rail corridor over time. It provides a comparative view of potential projects along the corridor, gives information on relative costs, and shows how the projects will benefit train service and performance and address community and environmental issues.

The Program-level EIR/EIS Purpose and Need Statement provides additional background on the needs for the PEIR/EIS, of which the Strategic Plan is a supportive document. These needs include:

### Future growth in population

In the two decades from 2000 to 2020, California's population is expected to increase by 31 percent, from 34.7 million to 45.4 million residents. Southern California's share of the population increase over the same period is forecast to be 3.4 million (or 23-percent), as shown in Figure 2-2. By 2020, just under half of the total statewide population will live in Southern California. This dramatic growth in population, and the increased travel demand that will accompany it helps drive the need for improvements to the LOSSAN corridor, an important component of Southern California's transportation network, and a rail corridor of national significance.

### Future growth in travel demand

Although the primary focus of this study is the improvement of the intercity passenger rail system, the total travel demand along the LOSSAN corridor is the result of the combination of the intercity, commuter and freight services. The demand for each service is described in the following sections, followed by a summary of the overall existing and proposed capacity of the rail corridor.

#### Intercity Trips

Intercity travel in California is projected to grow by 35 percent over the next twenty years, from 155 million trips to 209 million trips. For Southern California, defined here as the Counties of Los Angeles, Orange and San Diego, intercity travel is expected to grow by approximately 23.4 percent over a 23-year time span, from 36 million trips in 1997, to approximately 47 million in 2020.<sup>3</sup> Statewide, auto trips account for over 84 percent of all intercity travel and over 58 percent of the longer

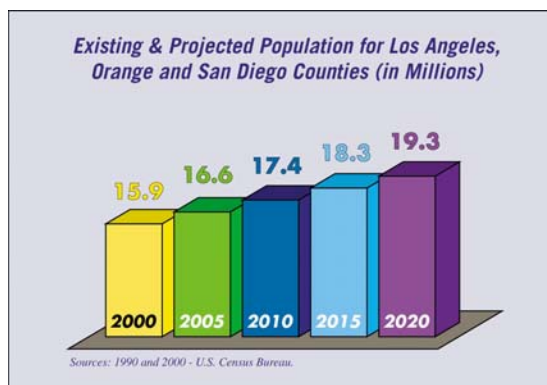


Figure 5-1– Projected population growth for Southern California

trips. In Southern California, this is even more pronounced, as the automobile currently dominates intercity travel. Table 2.1 below identifies the growth in traffic volume on the major highway link between Los Angeles and San Diego from 2000 to 2020. Automobile travel between Los Angeles and San Diego is currently the second largest geographic travel market in the state, accounting for 34.9 million trips in 1997.

Table 5.1 – Average Daily Traffic Volumes between Los Angeles and San Diego

Major Highway	Avg. Daily Volume 2000	Avg. Daily Volume 2020	% Change 2000 - 2020
I-5 between Downtown Los Angeles and Downtown San Diego	221,900	270,193	18%

Sources: The Department, OCTA, SCAG, and SANDAG

<sup>3</sup> Charles River Associates Incorporated, *Independent Ridership and Passenger Revenue Projections for High Speed Rail Alternatives in California*, January 2000



Currently, this intercity corridor is also the second busiest intercity rail corridor in the nation, carrying approximately 4,700 riders each day (1.7 million riders annually)<sup>4</sup> along the entire Pacific Surfliner corridor from San Luis Obispo to San Diego. Of this service, the segment between Los Angeles and San Diego has a current daily ridership of 3,900 (1.4 million riders annually). Intercity rail travel is anticipating exponential growth within the next 20 years. In 2001, Amtrak's 20-Year Improvement Plan projected 2005 and 2020 ridership along the rail corridor from San Luis Obispo to San Diego, using the total travel demand growth and constant mode share. By 2005, ridership is forecast to increase to approximately 5,500 riders per day (2 million riders annually) and to 15,800 daily riders (5.77 million riders annually) by 2020.

Regional and urban traffic is steadily increasing. This affects intercity travel by delaying travelers at specific highway chokepoints, therefore increasing congestion along the entire corridor. The proposed rail corridor improvements would help to accommodate a portion of this projected growth in travel demand.

#### **Additional Potential Benefits to Communities located along LOSSAN Corridor:**

A number of potential benefits may accrue to communities located along the LOSSAN corridor from the improved rail services that would result from the proposed rail improvements, including:

##### *Economic*

- Especially in beach communities, rail brings visitors and tourists directly into the downtown business districts and their hotels, restaurants, and other businesses.
- The possibility of additional visitors to the community could mean increased sales/hotel occupancy tax revenues to the cities.

##### *Planning Issues*

- Rail accommodates travelers without cars, reducing the need for additional parking lots and increases in the street width of local arterials.
- New/improved grade separations provide for better circulation on local streets that cross the rail lines, which reduces delays.

##### *Quality of Life*

- Reduced noise associated with train whistles as new grade separations eliminate the need to sound the horn at level crossings.
- Increased safety associated with grade separations, pedestrian crossings, and new beach access opportunities
- Increased mobility options
- Can reduce congestion within communities
- New revenues, such as from additional sales taxes generated, can help pay for additional community amenities (libraries, community centers, etc.)

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<sup>4</sup> California Department of Transportation, *Draft Pacific Surfliner Route FY 2001-2002 Business Plan*, January 10, 2001



### **Capacity of the Intercity Transportation System**

The growing population and economic activity in Southern California has placed severe demands on the already congested transportation system serving the area. Many of the highways and airports are currently operating at capacity and current plans for expansion will not keep up with projected growth over the next 20 years. Figure 5.3, on the following page, shows the existing and future train volumes along the Los Angeles to San Diego rail corridor.

The three rail services along the LOSSAN corridor are constrained by a corridor that is significantly undersized for the volumes of traffic it accommodates. Currently, 41 percent of the 125-mile rail corridor consists of a single track. The extensive sections of single-track greatly constrain the movements of trains through the corridor. By necessity, only a single train at a time can be present along any one stretch of single-track, causing other trains to stack at either end of the single-track section, resulting in delays, and reducing the attractiveness of rail as a travel mode choice.

The proposed improvements to the existing LOSSAN corridor would allow for a more reliable, safe, and competitive intercity travel option. This more balanced transportation system would relieve some of the projected near and long-term demand on the existing transportation infrastructure, potentially slowing the need to further expand highways and airports, or reduce the scale of those expansions, reducing their associated cost, community impacts and environmental impacts. The LOSSAN corridor rail improvements would augment the highway system, creating an interconnected, multimodal solution, allowing for better mobility throughout Southern California.

The LOSSAN corridor Strategic Plan assists in meeting these needs by laying out short and long-range visions and plans for the improvement of the rail corridor over time. It provides a comparative view of potential projects along the corridor, gives information on relative costs, and shows how the projects will benefit train service and performance and address community and environmental issues.

### **Travel Time**

Among the most important factors that impact the public's choice of transportation modes are travel time and reliability. Travel time is the time spent on the road, in the air, or on a train from a place of origin to a place of destination. Travel time is an important economic factor for business travel, as delays can affect worker productivity and planned business activities. Table 5.2 shows the approximate point-to-point travel time in 2000, which includes congestion effects, and the projected total travel time in 2020 for autos, compared with the existing and projected station to station travel time for Amtrak's Pacific Surfliner, based on information collected from Amtrak and the Regional Transportation Planning Agencies (RTPAs).

**Table 5.2 – Present and Future Travel Times between Los Angeles and San Diego**

Route	Auto 2000	Auto 2020	Rail 2000	Proposed LOSSAN Goal
Downtown Los Angeles to Downtown San Diego	2:35	3:15	2:44	< 2:00

Source: CHSRA

Table 5.2 notes that point-to-point travel times by rail and auto are comparable today, and that rail will be faster in the future, both as a result of the proposed improvements to the LOSSAN corridor, as well as because auto travel is projected to slow with increasing demand and the congestion created by that additional traffic volume.

Total travel time for rail, not shown in Table 5.2, includes time required to reach a station, time spent waiting for the next scheduled train, time spent getting to the boarding area, time spent checking or retrieving luggage, time spent getting a rental car or taxi, and time spent to reach the final destination. If rail is to be a viable alternative to the automobile, it must provide point-to-point times significantly better than the automobile, since rail cannot provide door-to-door service, as automobiles do. The lack of door-to-door service is partially offset by the advantage that rail destinations are usually located in the heart of a community, and close cooperation with local transit agencies can improve connecting travel to the final destination.

Intercity rail trip delays are mainly related to shared-track conflicts with commuter and freight trains. The proposed LOSSAN corridor improvements will reduce travel time over the next twenty years by increasing operating speeds and efficiency, while simultaneously enhancing grade crossing safety, and lessening environmental degradation. These improvements would benefit all rail services, including freight, intercity and commuter trains, passengers, automobile drivers, and the communities in which the improvements are located. The proposed rail improvements would help ensure the efficient transport of goods and freight, a critical component of the state's economic health. Consequently, the proposed improvements, and the strong cooperation between freight, commuter and intercity rail operators will provide for continued growth and efficient movement of people and goods within the LOSSAN corridor with statewide and even national benefits.

Without the proposed improvements, the corridor will not be able to meet the capacity demands required to allow for meaningful reductions in travel time, rail passenger service competitiveness will not increase and reliance on highway travel will increase.

### Reliability

Beyond travel time, travelers are also sensitive to reliability; i.e. the degree to which they can be certain to arrive at a given time. As discussed above, roadway congestion, and a growing intercity travel market, is adversely impacting the reliability of intercity automobile travel. Based on current performance and forecasted congestion levels, the reliability of highway travel will be severely impacted in future years.

According to the Texas Transportation Institute, there were approximately 811 million annual hours delayed in traffic by those who commuted by automobile in the Los Angeles and San Diego areas in 1999. This is the highest delay experienced by any urban area in the nation. There are many causes of increased highway congestion throughout Southern California. For example, accidents, stranded roadside cars, or a routine traffic violation stop can create a "rubberneck" effect as drivers slow at the scene

of the incident, delaying travelers for miles. In addition to typical congestion inducers, poor weather conditions (rain, wind, and fog) also negatively affect the reliability of highway travel times. Rain and wind can make roads dangerously slick, increasing the likelihood of accidents. Often times, fog, haze and glare impairs visibility and requires drivers to slow down.

The need to share space with freight and passenger trains, coupled with extensive sections of single-track on the rail corridor, often lead to delays along the rail corridor, since the delay of a single train often has the consequence of affecting other trains operating within the corridor. Double track, as an example, eliminates the delays currently associated with trains waiting at a passing track for others to clear a single tracked-section. Elimination of this type of delay alone would provide for more consistent operating schedule for trains, significantly increasing on-time performance and reliability. Proposed grade separations would also reduce the impacts of inclement weather, such as the coastal fog and haze from smog experienced during much of the year along portions of the rail corridor. These grade-separations would increase not only the reliability and operating performance of trains, but also provide for increased traffic flow on local streets that are presently subject to delays when trains are crossing.

On-time performance is also an important factor in attracting travelers. From 1999 to 2001, Amtrak's on-time performance within the LOSSAN corridor improved 6.6-percent, from 71.6-percent to 78.2-percent. This performance increase shows that Amtrak is making gains toward reaching its ultimate goal of a 90-percent on-time performance standard. The proposed rail improvements will improve the on-time performance and reliability of the passenger rail service by facilitating passenger and freight movements, accelerating Amtrak's ability to reach this goal.

## **Safety**

Safety is an overarching consideration in providing transportation. A key rail safety consideration focuses on reducing or eliminating interactions between people, automobiles and trains. These interactions occur most frequently at grade crossings, and where pedestrians trespass across rail lines to get to their destination.

Projected growth in the movement of people and goods by auto and rail over the next two decades underscores the need for improved safety. With more and more vehicles on the roadways and more frequent and faster trains, the potential for rail/automobile collisions increase.

Rail passengers must have confidence that the service provided them is not only reliable and fast, but is also as safe or safer than other modes. Nationally, passenger rail travel is one of the safest modes of transportation. Railroad safety in the United States has steadily improved over the past several decades, despite increases in both highway and rail traffic. A 1999 summary of state highway accident data compiled by the Department of Highway Safety and Motor Vehicles tallied 3,539 fatalities and 279,801 non-fatal injuries on California highways. This corresponds to an estimated injury rate of 1 death per 138 million vehicle kilometers of travel (VKT) (83 million vehicle miles of travel [VMT]) per year.

During the same year (1999), statewide there were 110 railroad fatalities (involving both freight and passenger trains), of which 86 of these were trespassers within the rail right-of-way<sup>5</sup>. Amtrak, since its formation in 1971, has had only 100 fatalities nationwide, while moving more than 600 million passengers. To help ensure that future increases in rail traffic occur without a corresponding increase in accident or injury, the State of California has embarked on an extensive rail safety information and education program. The proposed LOSSAN corridor improvements will address this need by reducing or eliminating the hazards at highway-rail crossings in designated higher speed rail corridors, as well as provide new or upgraded pedestrian crossings along the corridor. These improvements would be eligible for federal funding specifically intended to improve highway-rail crossings (established by Congress as part of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21).

In addition, the FRA has also developed its own guideline to address safety concerns at grade crossings. This guideline states that “public and private crossings where train speeds are between 90 and 110 miles per hour (mph) should be equipped with special crossing protection devices, grade separated, or closed”.

Even though overall accident rates are relatively low for railroads, the LOSSAN corridor traverses several highly traveled roadways and pedestrian areas at-grade, which when coupled with higher levels of rail traffic could lead to higher accident rates, if grade crossings are not eliminated and access issues addressed.

The safety improvements included in the proposed rail corridor improvements above will help in maintaining high overall rail passenger safety within the LOSSAN corridor when compared to other modes of transportation.

### **Modal Connections**

Good connections currently exist between intercity travel modes and the extensive regional urban and commuter transportation system in the region, as many rail stations also serve as local transit hubs. Connections continue to improve as new transit services are developed, and existing commuter and intercity become more integrated in terms of both service and fare/transfer agreements. An improved LOSSAN Corridor could also complement and allow for better connections to transit systems, providing a substantially greater degree of mobility for those who travel in Southern California. Improvements in modal connections are essential to the success of intercity rail. Since rail travel is not a door-to-door service, allowing for easy connections between home and station locations is a substantial enabling component to these improvements. At each station location, connections with local and regional transit systems, such as the Los Angeles County Metropolitan Transportation Authority (MTA) and Metro Rail, Southern California Regional Rail Authority (Metrolink), Orange County Transportation Authority (OCTA), North San Diego County Transit Development Board (NCTD) and the Coaster commuter service, San Diego Metropolitan Transit Development Board (MTDB) and the San Diego Trolley will be improved or provided to the greatest extent possible. Station improvements will also maximize access to and from the region’s extensive highway system.

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Significant benefits could be provided to the traveling public and the economy by the development of a true multimodal transportation system, due to the various advantages and disadvantages offered by the different modes of transportation.

### Air Quality & Environmental Resources

The Federal Clean Air Act (CAA) makes “transportation conformity” the affirmative responsibility of the U.S. Department of Transportation and regional Metropolitan Planning Organizations (MPOs). In California, transportation conformity addresses air quality attainment and maintenance strategies contained in the State Implementation Plan (SIP), used to evaluate transportation alternatives, including the No-Build Alternative.

Figure 5.3, at right, shows the urbanized counties in California designated as “Ozone Non-Attainment Areas”. All of Southern California is so designated. Maintaining and improving air quality is one goal of the State Transportation Improvement Program (STIP) and Regional Transportation Plans (RTPs). The challenges for metropolitan areas are to continue to reduce vehicle emissions to acceptable levels and maintain air quality standards by encouraging more efficient use of land resources, improving mobility, and providing alternative transportation facilities and services. Approaches aimed at reducing the demand for trips in single-occupant vehicles must be integral to all transportation plans and programs to ensure that these areas conform to federal air quality standards. Developing multipurpose corridors that combine designated lanes for high-occupancy vehicles, transit, and rail alternatives is a statewide transportation strategy for meeting air quality objectives. The proposed LOSSAN rail improvements would help implement this strategy.

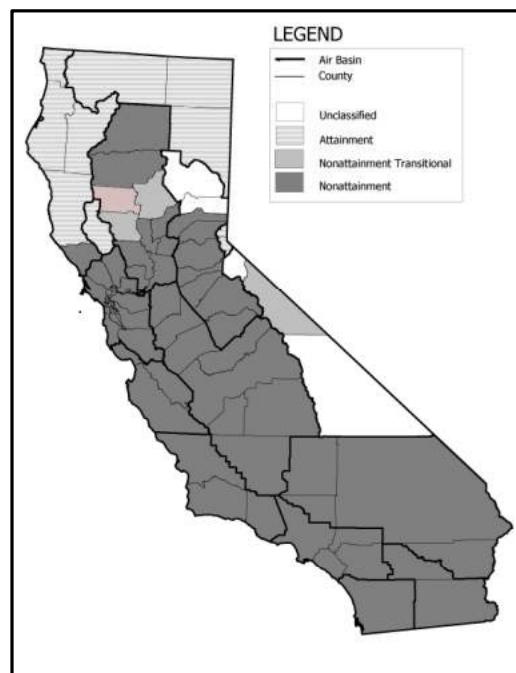


Figure 5.3  
1999 State Area Designation - Ozone

The objectives of meeting federal and state air quality standards over the next 20 to 40 years will also require reductions in the number of vehicle kilometers (miles) traveled, integrated land use and transportation planning and development, transportation demand strategies, operational improvements and use of new technologies that improve transportation efficiencies and provide a transportation alternative to the single-occupant automobile.

Moving passengers by rail produces significantly less pollution per passenger mile traveled as compared to typical automobile use, and would aid in reducing emissions throughout the corridor. The extent to which the objective of improving air quality can be met by an increased use of the intercity rail system will be explored in the Program EIR/EIS.

The protection of important coastal environmental resources, such as the lagoons and coastal bluffs, will also be a consideration of any improvements to the segments of the LOSSAN corridor as it traverses the coastline. The improvements considered in the Program EIR/EIS would dovetail with other efforts to restore sensitive environmental habitat, as well as provide new funding opportunities to mitigate and reduce the impacts of rail service. Where practicable, improvements to the conditions of sensitive environmental habitat will be made, such as increasing the opportunity for tidal flows in the lagoons as part of improvements to lagoon crossings. Identification of additional improvements to habitat conditions will also be explored in the Program EIR/EIS.



## 6.0 SCREENING OF ALTERNATIVES IN KEY LOCATIONS

Screening is the process by which the Department and the FRA determine which alternatives and design options should be carried forward in the Environmental review process. The screening process involves reviewing the range of options which have been identified at key locations. In these areas, the number of design options is sufficiently broad to allow removing from further consideration those options which, due to significant technical, environmental, and/or economic factors, are not practicable and would not serve to reasonably and feasibly meet the objectives, purpose and need for the proposed system. Those options remaining represent a range of the most reasonable and feasible means of responding to the project's objectives, purpose, and need. These are the alternatives which will receive detailed consideration in the program EIR/EIS.

This section of the Strategic Plan identifies the areas where screening recommendations can be made, and the significant reasons for recommending the removal of certain options from further consideration. In most areas of the corridors, there are at least two viable design options for the entire corridor (plus the No-Build option, which would retain the existing conditions). All of the screening recommendations have been developed with extensive input and cooperation from both FRA and the Authority, the Department's partners in the Program-level EIR/EIS process. In addition, these recommendations have been developed with input from the transportation agency review committees established by the San Diego Association of Governments (SANDAG) and Orange County Transportation Authority (OCTA), from state and federal-level resource agencies, and from the public.

There are five cities in four locations within the LOSSAN corridor where the range of design options under consideration is sufficiently broad to allow for the screening of options. Those options screened out will be documented in the Program EIR/EIS process as "Alternatives considered and eliminated from further study". This screening will save time, effort, and resources that would be otherwise required to study alternatives that are later determined to be infeasible and inferior to other alternatives. The locations where such screening opportunities exist are shown in Figure 6-1.



**Figure 6-1 – Locations for Screening**

- In San Diego County – Del Mar, and Encinitas
- In South Orange County – San Clemente/Dana Point and San Juan Capistrano

Most notably, there is enough technical data and public input (as a result of both previous public meetings and the public workshops held as part of the Strategic Plan process) to warrant eliminating the design options along the Del Mar Bluffs, on the beach at San Clemente, through the historic district at San Juan Capistrano, and the need to study an Inland Bypass Alternative. Each of these alternatives would result in significant environmental impacts and is burdened by severe public or agency opposition.

With the exception of the Inland Bypass Alternative, all the design options in this corridor being investigated by the Department were considered at a consistent level of analysis and were evaluated using standardized engineering, environmental, and financial criteria for the application of uniform methodologies. Data from the technical studies that have contributed to this report are included as Appendix “A”. The Inland Bypass Alternative was the subject of a preliminary investigation, which is summarized in Appendix “B”. This technical data, combined with public and agency input, has provided the Department and the FRA with the necessary information to eliminate this alternative from further study within the program EIR/EIS. Screening criteria used by the Department centered on the key issues of:

- Constructability
- Train Service and Performance
- Community
- Environment

The screening criteria focus on the elements that differentiate design options at Del Mar, Encinitas, San Clemente/Dana Point, San Juan Capistrano, and the Inland Bypass Alternative. In Del Mar for example, the key natural resources that differentiate the design options are potential impacts to coastal bluffs and lagoons. Appendix “C” further defines the screening criteria used to evaluate the design options. Summary sheets are also provided in Appendix “C” with rankings for either positive benefits or negative impacts for all of the criteria used to evaluate each design option included in this report.

## **6.1 Preliminary Options Not Carried Forward**

The community and environmental sensitivities and engineering challenges in the Cities of Del Mar, Encinitas, San Clemente and San Juan Capistrano are distinctive and sometimes unique to one community. Nevertheless, the four share one common constraint: an environment of high pedestrian traffic, where the railway acts as an impediment to access between the majority of the community and a desirable community resource, and yet the railway is accessible enough that people are not channelled to designated crossing points featuring gates and warning devices.

In these areas, simple at-grade double-tracking was considered early in the definition of alternatives. However, introducing extensive sections of double-track in such environments, without providing a significant expansion of the ability for pedestrians to safely cross over or under the tracks, greatly increases safety risks. Crossing two tracks, where trains could come in either direction on either track, and where the presence of a train on one track could screen the view of another train on the second track, is

significantly more dangerous than crossing a single track. Beyond the safety issues, the implication is also that speeds through the segment most likely could not be increased, negating much of the benefit of double-tracking.

While the concept of simple at-grade double-tracking was rejected, it was used as a starting point in defining alternatives along the existing alignment in the four communities. This process is described below.

**Del Mar:** An at-grade alternative along the coastal bluffs in Del Mar would face the factors noted above. In addition, since the bluffs are undergoing continuous erosion, it was apparent that any double-tracking alternative in this location would require significant excavation work to stabilize the bluff-top. This excavation would, in effect, create a partial trench, so the at-grade concept was modified to improve pedestrian access and reduce barrier restrictions by featuring a cut-and-cover trench in the bluff, which would provide for pedestrian movements over the covered portions.

**Encinitas:** In Encinitas, the at-grade alternative was expanded to feature two key vehicular and pedestrian grade-separations at Leucadia Boulevard and Birmingham, as well as several pedestrian-only underpasses. While final locations of the underpasses would be determined in future project-specific work, they would be located in Leucadia, where the rail separates a residential area to the east with the local shopping district and the coast to the west, and in Cardiff-by-the-Sea, where the rail separates the community from the ocean.

**San Clemente:** The track at San Clemente is **on** the beach. As a result, trespassing onto the rail right-of-way and crossing the rails away from designated crossing points is commonplace, with clear safety implications. To address these safety issues, train operating speeds are greatly reduced, leading to significant capacity and performance penalties in these areas. An at-grade alternative along the beach segment was modified to provide for easier pedestrian access through a cut-and-cover trench in the Pier Bowl area, the area of highest pedestrian activity. New pedestrian underpasses would also be provided to the south. A second alternative contemplated a cut-and-cover trench along the entire beachfront segment.

**San Juan Capistrano:** Up until the 1960's, downtown San Juan Capistrano featured a second passing track. This was removed by the Santa Fe Railroad, which saw it as an unnecessary maintenance burden in a time when intercity passenger travel was on the decline and commuter rail was decades away. While room is available to restore the second track at-grade, doing so would not provide any speed improvements in the highly-pedestrianized Franciscan Plaza area, as discussed above. Further, the presence of the Los Rios Historical District immediately to the west, with its sensitive adobe structures, eliminates the possibility of a grade-separation along the existing alignment, either by taking the rail below-grade, or by building a pedestrian underpass. The at-grade concept was therefore modified to feature a grade-separation under the Franciscan Plaza, to the east of the existing station to provide a greater buffer to the Los Rios District.

Due to physical constraints, visual and environmental issues, and community concerns, elevated railway viaduct structures (except at water crossings) along the beachfront and in the San Juan Capistrano historical area were also not investigated.

## 6.2 DEL MAR

A number of options exist in the Del Mar area, including the “No-Build” (maintaining the existing conditions) option, a trench option, and three tunnel options, as shown below:

- No-Build
- Camino Del Mar Tunnel #1
- Penasquitos Lagoon Bypass Tunnel
- Trench-in-Bluffs
- Camino Del Mar Tunnel #2

The following subsections provide descriptions of each of the options in Del Mar (except for the No-Build option), and the recommendation of whether the option be carried forward for further evaluation or screened. (It is important to note that the “No-Build” option represents the existing conditions and will always be carried forward for further consideration).

### Alignment and Station Location Options Carried Forward for Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended for further evaluation (see Figure 6-2):

**Camino Del Mar Tunnel #1:** The Camino del Mar Tunnel would provide an alternative to retaining the rail line on Del Mar’s sensitive bluffs by relocating the tracks into a tunnel which would run under Camino Del Mar.

The Camino Del Mar Tunnel #1 option would improve train performance and would reduce environmental impacts from the existing conditions – providing considerable benefits to the environment and community.

Relative to the no-build condition, the Camino Del Mar option #1’s double track layout would increase track capacity, and its fully grade-separated profile and smoother curves would provide for reduced running times. Safety and reliability would also improve, as would the operations and maintenance of rail services. There would be construction issues associated with the tunnel, and the cost associated with the tunnel alternative would be significant. However, the cost-effectiveness of this option is assessed as good, because the tunnel costs are about the same as those of the Trench-in-Bluffs option, and the improvements to train performance are considerably greater.

The Camino Del Mar Tunnel #1 option would have community benefits and reduce environmental impacts, as the rail line would be removed from the Del Mar Bluffs. The Tunnel option also includes an opportunity for reduced lagoon impacts, as the rail line could be placed on a concrete structure through Penasquitos and San Dieguito Lagoons, allowing for the removal of fill and increased tidal flow. Coastal access and barrier issues would be greatly reduced as a result of this Tunnel option. Although careful design and construction is required to avoid disruption to commercial and residential properties on either side of Camino Del Mar, this Tunnel alternative would not likely require tunneling directly under any structures. Further, properties located adjacent to the existing rail line would see a benefit from the Tunnel option, as the rail

was removed from the bluffs and noise and vibration would be generally greatly reduced as a result of the tunnel.

The Camino Del Mar Tunnel #1 option has received a considerable amount of support from the community and State and Federal resource agencies that would like to see the existing track removed from the bluffs.

**Penasquitos Lagoon Bypass Tunnel:** This option would relocate the rail line on Del Mar's sensitive bluffs into a tunnel which would run under I-5. The tunnel would begin approximately midway along the existing alignment through Penasquitos Lagoon, where the line would shift eastwards into the I-5 right-of-way. It would follow I-5 in a tunnel configuration under the centerline to north of Del Mar Heights Road. As it approaches the San Dieguito Lagoon, this option would turn northwestward and emerge from the tunnel, skirting the southern edge of the San Dieguito Lagoon and the Del Mar Fairgrounds in a combination of at-grade and elevated profiles, until rejoining the existing LOSSAN alignment at the crossing of the San Dieguito River.

The Penasquitos Lagoon Bypass Tunnel would have the same positive benefits to the Del Mar bluffs and community as the Camino Del Mar Tunnel. However, this option would be considerably more expensive to construct than the Camino Del Mar Tunnel #1 (estimated \$250 million more) because the topography of this alignment requires a tunnel about twice as long as the Camino Del Mar Tunnel #1 option.

The primary additional benefit of this option is that it would further reduce lagoon impacts by creating an alignment that avoids much of Penasquitos Lagoon. It would also have the least noise and vibration impacts. However, this option would have more property impacts and constructability issues than the Camino Del Mar #1 Tunnel alternative.

State and federal resource agencies have indicated that they believe this option should be investigated as part of the program EIR/EIS process. It is likely to have considerable community support since, like the Camino Del Mar Tunnel #1 option, it would result in the removal of the existing track along the bluffs.

A more northerly return to the existing LOSSAN corridor was examined, one which could further reduce potential impacts to San Dieguito Lagoon. There are challenges associated with taking this option further north, past the San Dieguito River. These challenges include:

- Extremely tight rail curves would be required to transition back to the existing corridor. The reductions on train performance to negotiate these curves would effectively negate the benefits of double tracking in this area.
- The land in this area sits on a floodplain, eliminating possibility of continuing the option in a tunnel, and requiring the track to be at-grade or on an elevated structure.
- Crossing the Del Mar Fairgrounds, owned and operated by the 22<sup>nd</sup> District Agricultural Association, would have serious repercussions on their operations.
- Similar to possible impacts to residential areas in the south of Del Mar (as discussed with the Camino Del Mar Tunnel #2 option below), there would be substantial impacts to residential areas in southern Solana Beach as a result of a more Northern alignment.



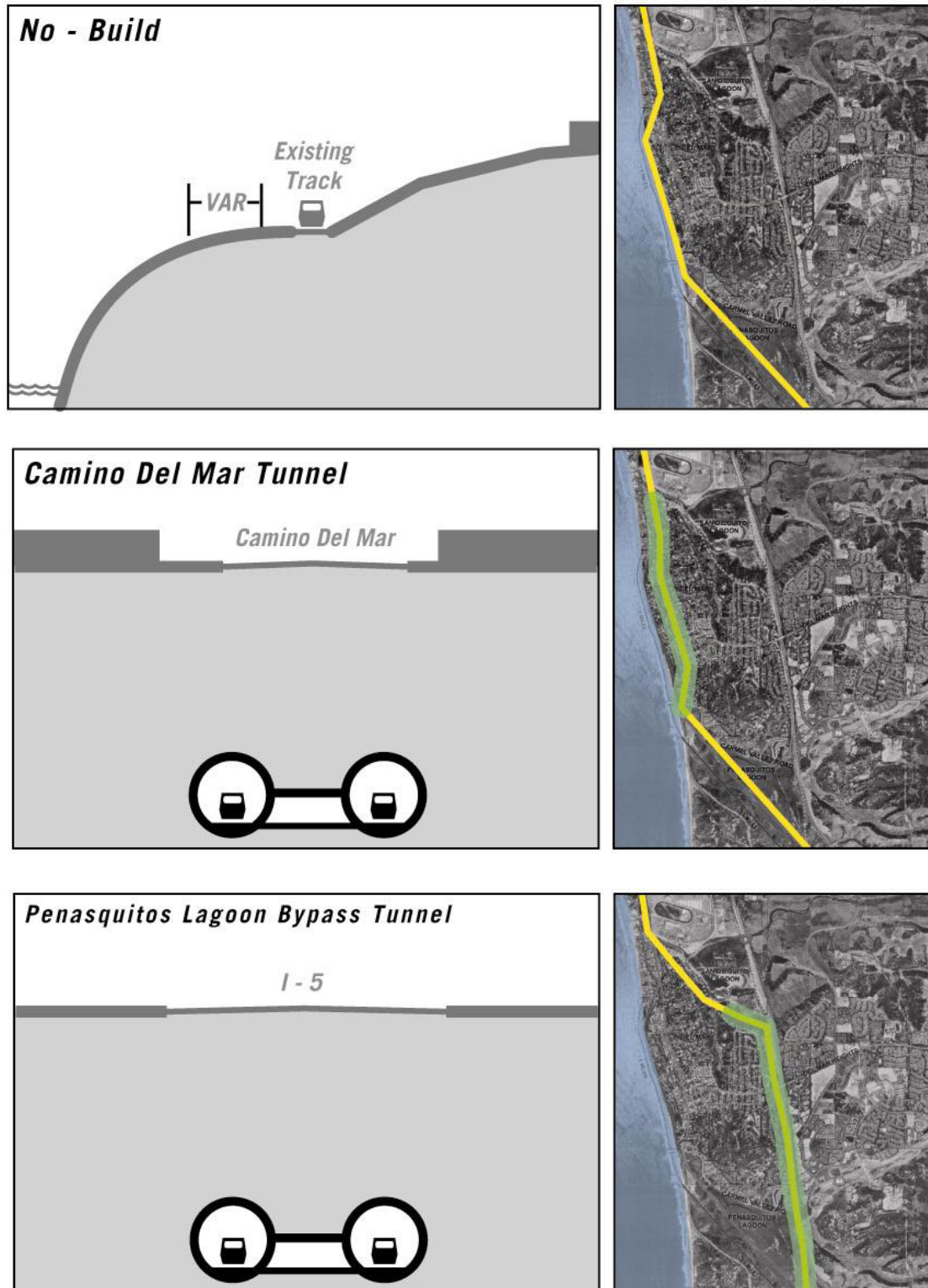


Figure 6-2 – Options to Be Retained for Further Study in Del Mar



### Alignment and Station Location Options to be Eliminated from Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended to be eliminated from further evaluation (see Figure 6-3):

**Trench-in-Bluffs:** The Trench-in-Bluffs (Trench) option would follow the existing rail alignment, but would provide two mainline tracks in a concrete trench (partially covered) along the Del Mar Bluffs. In order to do so, significant bluff stabilization efforts would be required, including tie-backs at the top of the Bluffs, a seawall at the base of the bluffs, and retaining walls within the trench itself.

The “Trench-in-Bluffs” alignment alternative would have severe construction impacts and would introduce major environmental impacts due to the required bluff stabilization.

The Trench option offers very significant constructability challenges, most notably because of the nature of bluffs themselves (see Figure 6-4). Attempting to stabilize the fragile coastal bluffs would require major construction efforts, including a 10-20 foot high seawall at the base of the bluffs, retaining walls within the trench itself, and tie-backs at the top of the bluffs, resulting in drastic changes to the existing environment. The use of heavy construction equipment in this sensitive environment would also be problematic. Moreover, the constrained space available for construction of the trench and the need to maintain rail service during construction would create significant impacts.

The Trench option would have the highest environmental impacts. In areas where the trench would be covered, community impacts and barrier issues would be reduced, however, in other areas where the trench was either open or the alignment was at-grade, these impacts would be exacerbated because of the double-track width of the trench. The Trench option would not remove the rail line from the bluffs, but rather would submerge it into the bluffs, creating new, different impacts (including the need for the stabilization methods noted above). The stabilization of the bluffs would result in the highest impacts on natural resources, and the bluffs have major geological and soils constraints. Construction on the bluffs would have high impacts to erodible soils, unstable slopes, and aesthetics and visual quality. Property impacts with the Trench option would include the likely need to acquire property during the construction period in order to stage equipment and materials.

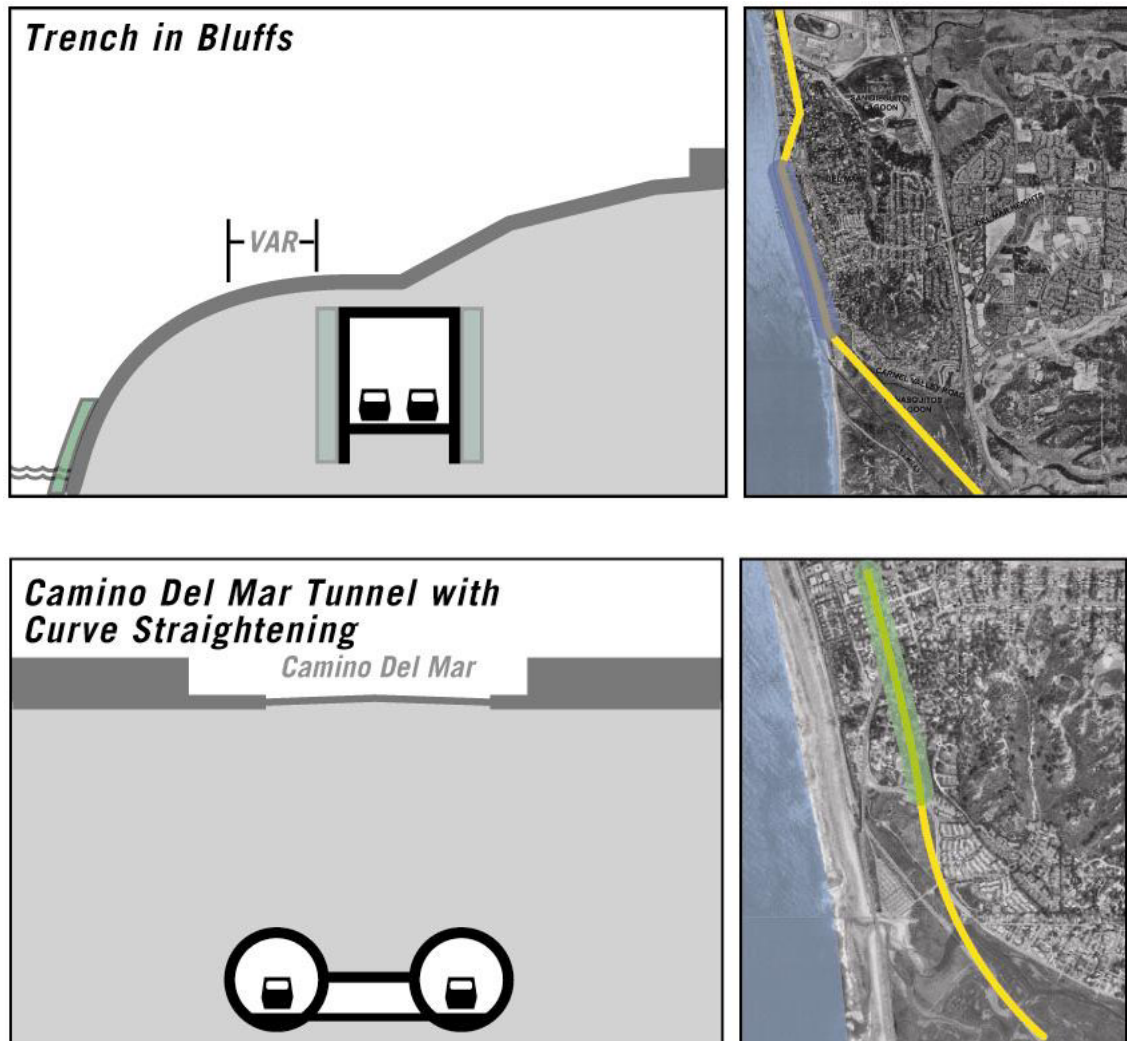
Public and agency input has been nearly unanimous in favor of removing the track from the fragile bluffs. The concept of major stabilization and trench-and-cover construction along this highly environmentally sensitive area would be strongly opposed by both the community and the state and federal resource agencies.

**Camino Del Mar Tunnel #2:** The Camino Del Mar Tunnel would relocate the rail line on Del Mar’s sensitive bluffs into a tunnel which would run under Camino Del Mar. The Camino Del Mar Tunnel #2 Option is a variation of the Camino Del Mar Tunnel #1 Option, where curve straightening included in this option would take the tunnel beneath a residential area at the southern end of Del Mar and the northern edge of San Diego.

This design option would be more costly and create more community and potential environmental impacts than the Camino Del Mar Tunnel #1 while providing only minimal travel time benefits due to the curve straightening.

As a result of the curve straightening at the south end of Del Mar, there would be some significant property impacts (acquisitions and easements) in the tunnel transition areas, and where the tunnel passed beneath residential property. In addition, the curve straightening would cross Penasquitos Lagoon at a new location, causing additional impacts and disruption to this environmentally sensitive area. Furthermore, it is estimated that this option only improves running times by about 20 seconds as compared to the Camino Del Mar Tunnel #1 alternative.

Community acceptability for the Camino Del Mar Tunnel #2 option is generally negative, with the community greatly preferring the Camino Del Mar Tunnel #1 alternative which stays under the public right-of-way of Camino Del Mar.



**Figure 6-3 – Options to Be Screened from Further Consideration in Del Mar**



**Figure 6-4 – Train passing along Del Mar Bluffs**

### 6.3 ENCINITAS

A number of design options exist in Encinitas, including the “No-Build” (maintaining the existing conditions) option, an upgraded version of the existing at-grade alignment, and two trench options, as shown below:

- No-Build
- At-Grade with Grade Separations (Note: All the build options in Encinitas include the Grade Separations)
- Short Trench
- Long Trench

The following subsections provide descriptions of each of the options in Encinitas (except for the No-Build option), and the recommendation of whether the option be carried forward for further evaluation or eliminated. (It is important to note that the “No-Build” option represents the existing conditions and will always be carried forward for further consideration)

#### Alignment and Station Location Options Carried Forward for Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended for further evaluation (see Figure 6-5):

**At-Grade with Grade Separations:** This option would provide double-tracking throughout Encinitas with new grade separations at Leucadia Blvd. at Pacific Coast Highway/Vulcan Dr., and Birmingham Drive at San Elijo. Additionally, new pedestrian crossings would be provided.

Train capacity would greatly improve as a result of the double-tracking provided as part of the “At-Grade with Grade Separations” option. Safety would be significantly improved, as the opportunities for interaction between pedestrians and trains would be diminished with the grade separations at Leucadia Blvd. and Birmingham and pedestrian crossings. The risk of accidents with cars would also be diminished with the two major grade separation projects and reliability and traffic circulation would also improve with this option.

This option would not provide the full grade separation benefits of the Short Trench concept, leaving the crossings of D and E streets at-grade. However, this option would be considerably less expensive (estimated at \$150 million less) than the Short Trench concept.

Although this concept does not have as much support from the community as the Short Trench option, the grade-separations at Leucadia Blvd. and Birmingham Drive are supported and would provide significant benefits to the community.

**Short Trench:** This option would locate a double-tracked cut and cover tunnel in the downtown area (approximately 1.5 miles), and grade separations at Leucadia Blvd. at Pacific Coast Highway/Vulcan Dr., and Birmingham Drive at San Elijo. Additionally, new pedestrian crossings would be provided in the Leucadia and Cardiff communities.

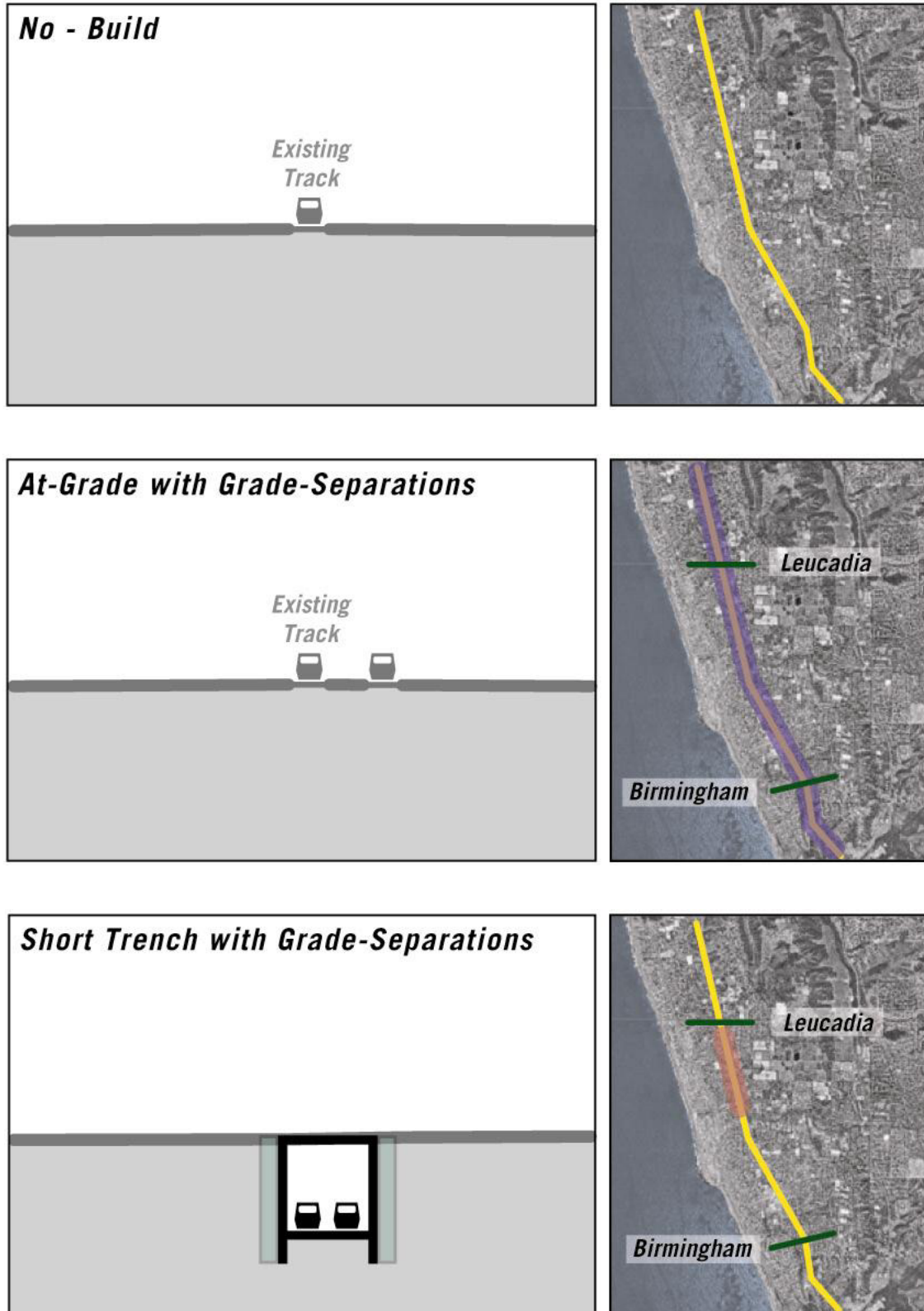
The Short Trench option would improve train performance and would reduce environmental impacts from the existing conditions – providing considerable benefits to the environment and community.

Train capacity would greatly improve as a result of the double-tracking provided with the Short Trench option. Safety would be significantly improved, as the opportunities for interaction between pedestrians and trains would be diminished, and the grade separations at Leucadia Blvd. and Birmingham, as well as D & E Streets downtown, would eliminate the risk of accidents with cars at these crossings. Reliability would also improve with this alternative. An additional benefit of this alternative is that it could be constructed in phases, where the grade separations at Leucadia Blvd. and Birmingham Drive and new pedestrian crossings could be made prior to securing the funding for the actual trench and cover construction through downtown Encinitas.

Environmental impacts from existing rail services would be reduced with the implementation of the Short Trench option. The Short Trench option would improve community cohesion and coastal access opportunities would also increase. Noise and vibration would be reduced as a result of the Short Trench and traffic circulation would improve as a result of the two grade separations included in this option.

Public acceptability for the Short Trench Option has been very positive.





**Figure 6-5 – Options to be Retained for Further Study in Encinitas**

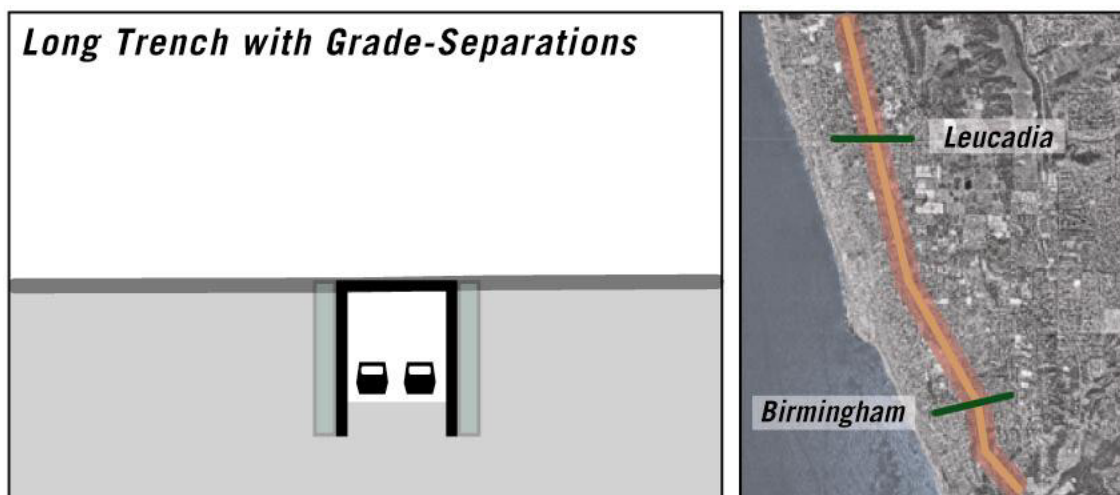
### Alignment and Station Location Options to be Eliminated from Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment option is recommended to be eliminated from further evaluation (see Figure 6-6):

**Long Trench:** This option would consist of a double-tracked open trench that would extend the length of the City. The trench would be covered through the downtown area, and new pedestrian crossings would be provided at other locations. The Long Trench option would be considerably longer than the Short Trench in that the trench would run through the extent of Encinitas (approximately 7-miles), rather than just the downtown area.

The majority of the train performance and community benefits associated with the Long Trench would also be provided with the Short Trench option. However, the Long Trench option would have much higher costs and considerably more construction impacts/issues associated with the construction of a 7-mile long trench. The Long Trench is expected to cost at least \$250 million more than the Short Trench option. Moreover, the at-grade crossings at Leucadia Blvd and Birmingham Drive would remain until the Long Trench was fully-funded and constructed.

The Long Trench's cost-effectiveness is rated negatively because of the significant construction issues and much higher cost associated with the construction of the Long Trench – with only minimal additional community and environmental benefits over the Short Trench option. Although there has been considerable public support for this concept in the past, its high cost and constructability issues makes this option considerably less feasible than, and certainly inferior to the Short Trench option.



**Figure 6-6 – Option to Be Eliminated from Further Consideration in Encinitas**



## **6.4 SOUTH ORANGE COUNTY INLAND BYPASS ALTERNATIVE**

During the Scoping process held in Spring 2002, continuing concerns about improvement alternatives within the existing alignment in the South Orange County Cities of San Juan Capistrano, Dana Point and San Clemente led to strong requests by the public to study an alternative that would bypass the highly sensitive segments of these communities. In Summer 2002, the Orange County Transportation Authority and the South Orange County Rail Working Group asked the Department to study an Inland Bypass Alternative that would locate any future rail improvement projects along an inland route, one which would bypass the South Orange County cities of San Juan Capistrano, Dana Point, and San Clemente.

Earlier in its own process (2001), the California High-Speed Rail Authority had studied the possibility of locating a fully-grade separated, electrified high-speed rail line in the same vicinity, but due to significant community, environmental, cost and train performance issues, opted to eliminate this corridor from further consideration.

The Authority has shared the results of its findings with the Department, as a means of helping the Department to determine whether further study of an Inland Bypass Alternative is desirable and would provide additional alignment options for further consideration in the Program-level EIR/EIS process.

There are a number of issues related to an Inland Bypass Alternative, including:

- The topography of the Inland Bypass Alternative study area, and its implications for train performance and route constructability
- Environmental concerns
- Transitions to and from the existing LOSSAN corridor
- Impacts to existing adjacent land uses
- Costs of the new corridor
- Train Service and Performance Benefits/Impacts
- Implications for the existing LOSSAN corridor

These issues are illustrated in Exhibit 6.1, and the following subsections address each of them in greater detail. Further detail is also provided in Appendix B.

### **6.4.1 Topography**

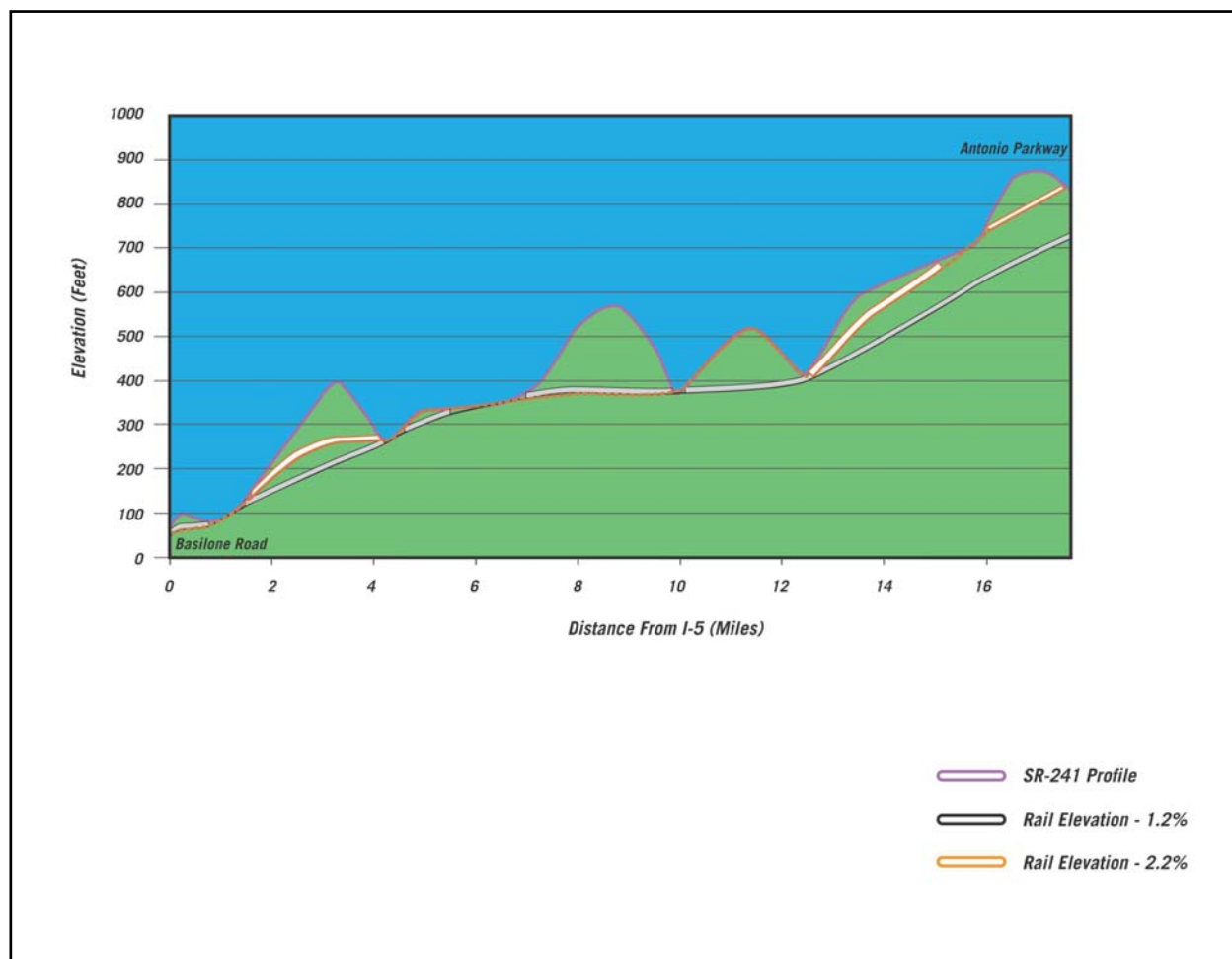
The existing LOSSAN Corridor lies where it is due to favorable topography. Trains perform best where the grades (steepness) of the land over which they travel are not great. While the performance capabilities of trains have increased since the rails were placed, certain characteristics continue to limit the potential grade over which trains can efficiently travel.

For passenger trains, a maximum grade of between 1 and 2 percent is standard (with a 1 .2 percent grade the ideal maximum). While conventional diesel-powered trains can negotiate steeper grades of 2-3 percent over a short distance, they will slow significantly. Adding curves to the mix slows trains even further. Freight trains offer even more challenge and are unable to efficiently negotiate grades above 1.5 percent.

The shared-use nature of the LOSSAN corridor requires that grades accommodate freight trains.

Traveling inland from the coast in Southern Orange County, the topography becomes very problematic from a rail design standpoint. The hills and canyons would require significant tunneling in order to provide for the relocation of the LOSSAN corridor.

Based on the rough, varied topography of the Inland Bypass Alternative study area, it becomes clear that there would be significant need for tunnels or built structures in order to maintain the necessary and desirable grades and to limit the number of tight curves in the new corridor as the train passes through the many canyons and over the water courses in the study area.



**Figure 6-7 – Grades within the Inland Bypass Alternative Study Area and Tunneling Required**

Figure 6-7 shows the steepness of the Inland Bypass Alternative Study area as measured from the I-5 moving away from the coast at Basilone Road in southernmost Orange County north toward the current termination of SR-241 (the Foothill South Toll Road) at Antonio Parkway, along the Far East Alignment, a possible rail alignment route whose topography is well known. The figure also denotes the relative ability of passenger and freight trains to negotiate the rise and fall along the toll road's right-of-way. Since this exhibit was prepared for the Authority in 2001, the TCA has revised the profile of this alignment, eliminating grades greater than 4%. The TCA has also noted

the possibility of smoothing the grades further through more extensive earthwork. Nevertheless, the topographic challenges continue to be significant, and it is likely that several sustained grades of 2% or more would remain.

A preliminary estimate, based on the graph shown in Figure 6-7, indicates up to 20 miles of tunnel along an Inland alignment, much of it continuous. Tunnels greater than 6 miles in length offer significantly greater complexity including the need for extensive ventilation shafts and the difficulties of operating non-electric, diesel-powered equipment in such a long tunnel. Tunnels of over 10 miles raise fundamental questions of constructability given California's seismic and soil conditions. Additional miles of tunneling would also likely be required north of this point, before rejoining the LOSSAN corridor.

The study area also includes sections wherein the soil types are subject to liquefaction or earthquake-induced slides, complicating design and construction.

#### **6.4.2 Environmental Concerns**

The Inland Bypass Alternative study area includes the last large remaining parcels of undeveloped land in Orange County outside the land preserved as part of the Cleveland National Forest, largely comprised of the 25,000-acre Rancho Mission Viejo. Several concerns have been raised about development of any kind in this area, including the completion of the SR-241 Foothill-South Toll Road.

Environmental Concerns include:

- Impacts to Wetland and Water Resources - Water and wetlands resources within the Inland Bypass Alternative study area are extensive, with 24 known wetland and riparian areas (a listing of these areas is included in Appendix B). Between Irvine and the San Diego county line, the Inland Bypass rail corridor would involve crossing three rivers and 12 creeks.
- A floodplain impact - The study area includes numerous 100-year floodplain zones, and is associated with unnamed drainages, tributaries and small creeks. In South Orange County these floodplains vary in size from 100 to 5,000 feet wide.
- Possible impacts to Threatened and Endangered Species & Habitat, Wildlife Refuges - Twenty-one threatened and endangered species are known to exist within the study area, ranging from "Species of Special Concern" to those federally listed as "Threatened".
- Farmland impacts - From the current terminus of SR-241 at Oso Parkway south to SR-74 (Ortega Highway), there are scattered parcels of farmland identified by the California Department of Conservation as either "Prime and Unique" or "Farmland of Statewide Significance".
- Parks and Recreational Resources – In addition to the aforementioned Riley Wilderness Park and Rancho Mission Viejo Ecological Reserve, the study area includes O'Neill Regional Park and San Onofre State Beach.

Federal and State resource agencies, including the Federal Environmental Protection Agency, United States Army Corps of Engineers, U.S. Fish and Wildlife Service, California Department of Fish and Game, and California State Parks Service, have previously expressed concerns over the introduction of a new rail corridor in South Orange County, citing reasons and factors such as those highlighted above.

The U.S. Fish and Wildlife Service has provided a letter expressing its opposition to an inland route in Orange County (the complete text of which is part of Appendix D). The Service's is concerned about potential impacts of a new rail alignment on sensitive and listed species, as well as the potential for loss and fragmentation of habitat.

### 6.4.3 Transitions to/from the existing LOSSAN corridor

A significant consideration in the creation of a new Inland Bypass Alternative alignment is how the new corridor would divert from the existing LOSSAN rail corridor. It is likely that such a transition would take place near the Irvine Transportation Center (ITC). Three options for this transition exist, including:

1. A transition north of the ITC, previously examined by the Authority, routing the rail line along the SR-133 toll road corridor before joining the SR-241 toll road corridor. This option would have required either a new station to serve high-speed rail, or the relocation of the ITC to a new location near Jeffrey Road. The City of Irvine is on record opposing the ITC's relocation.
2. A southeast route, beginning south of the ITC, through either the city of Irvine or Lake Forest. Possible alignments could be along major arterials such as Alton Parkway or Bake Parkway, both of which are meandering and largely developed on either side.
3. A route traversing the former El Toro Marine Air Station property, which could be challenging given the current plans for the site's redevelopment. Any of these options would require extensive disruption of existing and planned land uses, call for significant land and right-of-way acquisition, and generate significant controversy from residents and cities along the proposed alignment.

Any of these options would require extensive disruption of existing and planned land uses, call for significant land and right-of-way acquisition, and generate significant controversy from residents and cities along the proposed alignment.

In the south, the most likely transition would be near the border of Orange and San Diego counties, just north of the San Onofre Nuclear Generating Station and near Basilone Road. The land east of the I-5 Freeway is part of San Onofre State Beach. The transition would require either a "flyover" crossing of the I-5 Freeway, or a short tunnel beneath the freeway. Such a crossing would require the permission of the California State Parks Department and the establishment of a use easement to permit rail to operate within the park.

### 6.4.4 Impacts to Adjacent Land Uses

As mentioned above, in order to bypass the South Orange County cities of San Juan Capistrano, Dana Point, and San Clemente, it would be necessary for the rail corridor to divert to a new Inland Bypass route somewhere in the vicinity of Irvine or Lake Forest, and pass through the cities of Irvine, Lake Forest, Mission Viejo, Rancho Santa Margarita, and San Clemente on its way south to reconnect with the existing LOSSAN corridor.

West of the closed El Toro Marine Base, existing land uses are largely agricultural, becoming primarily residential in the cities of Lake Forest, Mission Viejo, and Rancho Santa Margarita. Should the rail corridor be located within the SR-241 toll road right-of-way, south of Oso Parkway, the land there is largely undeveloped, although the

alignment would pass west of General Thomas F. Riley Wilderness Park and just east of the Rancho Mission Viejo Ecological Reserve.

There would be potential impacts from the introduction of this new transportation facility to these adjacent land uses. As mentioned above, land uses in South Orange County are generally residential in nature, but also include office parks, light industrial/warehouses, commercial/retail developments, recreational resources and open space.

Potential impacts could include:

- Community Impacts, such as a change in “Quality of Life”, impacts to residential home values, or economic losses to the local business community, and new costs to cities along the rail corridor as a result of construction and rail operations, as well as the introduction of new visual impacts.
- Property Impacts (including the need to acquire properties and businesses for right-of-way or to secure easements, as well as changes to their valuation as a result of their proximity to the rail line.)
- Noise and Vibration. While the construction of a new rail corridor would allow the opportunity to build using the highest level of materials available (such as concrete ties and continuously-welded steel rail), residents and businesses might still experience an impact from the noise and associated vibration which naturally accompany train operations.
- Pedestrian access/Barrier Issues. The new, double-tracked rail corridor might pose barrier issues, bisecting a community or reducing existing pedestrian access opportunities into areas that had not had such issues previously.
- Traffic circulation. Depending on the alignments selected, there might be need to provide at-grade or grade separated crossing of streets and highways along the route. This could have an impact on the traffic circulation patterns and roadway network.

#### **6.4.5 Costs of the New Corridor**

Costs for an Inland Bypass Alternative rail corridor cannot be accurately predicted without a specific alignment and profile. However, given the costs of land acquisition, construction (including tunneling) and costs of tracks, signaling and station construction, it is likely that the costs would be in the billions of dollars.

As a point of comparison, the Authority’s previous analysis of possible Inland Bypass Alternative routes would call for 62 miles of new double tracking, much of it on a structure, in a tunnel, or on a long-span bridge, as the rail line crosses several canyons and rivers. The Authority determined the costs associated with an Inland corridor to be approximately \$1 billion more than the conventional improvements proposed for the LOSSAN corridor in the same area. This conclusion was for an electrified, passenger-only system capable of negotiating sustained grades of up to 3.5%. The cost would increase significantly from that estimate as a profile to accommodate conventional passenger trains or freight along the same alignment.

#### 6.4.6 Train Service and Performance Benefits/Impacts

The creation of a new, double-tracked rail corridor on an Inland Bypass Alternative corridor would provide increased track capacity, and could provide access to a new rail market along its route. However, it would be substantially longer, and the grades and curves along a potential alignment (with or without tunneling) would likely increase running times. Because there are fewer people, and a generally lower level of development in the interior portions of Orange County, and because regulatory and operating agencies would likely insist that the new corridor be fully grade-separated, it is possible that there would be opportunities for improved safety. Reliability would be improved by the presence of two mainline tracks, and from the perspective of passenger rail service, the absence of freight service on the Inland Bypass Alternative corridor could also yield increased reliability.

These positives would be outweighed by the negative impacts to train service and performance as a result of the longer length of the inland route, and the costs of building and establishing new service in this area.

There is also a significant question as to how Amtrak (provider of the Pacific Surfliner intercity rail service) and the Southern California Regional Rail Authority (operator of the Metrolink commuter rail service) would be affected. Would they seek to continue to serve the existing LOSSAN corridor, or would they opt instead to serve the Inland corridor only? Would the existing and future markets along both corridors justify a high level of service to both? More likely, ridership on both Amtrak and Metrolink services would suffer as a result of the relocation of the rail corridor.

While there would be the possibility of a new station location which could serve residents of the Talega development in San Clemente and the new communities which are envisioned in the master plan for the development of Rancho Mission Viejo, passenger and commuter rail service might be lost in San Clemente, Dana Point, San Juan Capistrano and Laguna Niguel. Particularly in the community of San Juan Capistrano, which has a long positive history with railroads, and in Laguna Niguel where the City recently opened a Metrolink station, this might create an undesirable condition.

As well, whether the combined rail owners and operators would be able (or willing) to assume maintenance of the two corridors remains to be determined. In early May 2003 the Department sent a request for information to Amtrak and Metrolink, seeking their input and best assessment as to what the creation of an Inland Bypass Alternative alignment would do to their service planning and operational considerations. Their responses raised questions about organizational responsibility for acquisition, development and maintenance of the new right-of-way, as well as a concern about operational benefits in terms of scheduling or ridership as a result of a new inland route. Amtrak in particular stressed the ridership in San Juan Capistrano, fifth overall in the Pacific Surfliner corridor. The complete text of their letters can be found in Appendix D.

If service moves exclusively to the new corridor, the lower population densities of the Inland communities and the decrease in ridership as passengers who previously traveled by rail chose other modes could result in reduced operating revenues despite the increased costs involved in the construction of an Inland Bypass Alternative corridor.



#### **6.4.7 Implications for the existing LOSSAN corridor**

Given the grades found within the Inland Bypass Alternative Study area, it is highly likely that freight service would need to remain on the existing LOSSAN corridor, and that the Inland Bypass corridor would be exclusively for the use of passenger (intercity and commuter) rail services. This would result in a situation where two rail corridors existed in South Orange County, with environmental and community issues along each, and no removal of the existing rail corridor along the coastline in Dana Point and San Clemente.

Elimination or relocation of stations as a result of the Inland corridor would reduce accessibility to rail service for residents of Irvine, Lake Forest, Laguna Hills, Laguna Woods, Laguna Beach, Mission Viejo, San Juan Capistrano, Dana Point, and San Clemente.

#### **6.4.8 Summary and Recommendation on the Inland Bypass Alternatives**

An Inland Bypass Route would not be a practicable alternative due to the following factors:

- It represents a long and slow alternative
- It would be the most expensive alternative studied, significantly more than any of the proposed improvements along the existing LOSSAN corridor
- It raises considerable environmental issues
- It features grades steep enough to require extensive tunneling, all-but-eliminating the possibility of the new route's use as a freight corridor.
- Retention of the existing alignment to accommodate freight creates a situation in which environmental and community issues are created on two corridors, rather than the opportunity to improve conditions along the existing corridor, with no benefits either to South Orange County cities, the environment, or to rail operators.

Much of the impetus behind the Inland Bypass alternative was a continuing concern over the further study of LOSSAN improvements through downtown San Juan Capistrano and the coastal alignment through San Clemente. As discussed in the following sections, those alternatives are recommended for elimination. In a similar manner, it is proposed the Inland Bypass be dropped from further study in the Program EIR/EIS.



## 6.5 SAN CLEMENTE/DANA POINT

A number of design options exist in the the San Clemente/Dana Point area, including the “No-Build” (maintaining the existing conditions) option, two trench options, and three tunnel options, as shown below:

- No-Build
- Short Tunnel – I-5
- Long Split Tunnel (with station)
- Short Trench (along the existing alignment)
- Long Trench
- Long Single Tunnel (without station)

The following subsections provide descriptions of the each of the options in San Clemente and Dana Point (except for the No-Build option), and the recommendation of whether the option be carried forward for further evaluation or eliminated. (It is important to note that the “No-Build” option represents the existing conditions and will always be carried forward for further consideration)

### Alignment and Station Location Options Carried Forward for Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended for further evaluation (see Figure 6-8):

**Short Tunnel – I-5:** This option would straighten the Dana Point curve, and double-track the corridor along the existing right-of-way until just north of the San Clemente Metrolink station, where the alignment would begin to enter into a trench and then turn inland, tunneling just north of Avenida Pico, where a new station would be provided in an open trench. The alignment would remain in a twin-bored tunnel beneath the Interstate 5 right-of-way, leaving the right-of-way just north of Basilone Road and exiting the tunnel and returning to grade level at San Onofre Creek, and rejoining the existing LOSSAN corridor.

The Short Tunnel option would improve train performance and would reduce environmental impacts from the existing conditions – providing considerable benefits to the environment and community.

The Short Tunnel option would provide increased train capacity, and would improve running times, safety, and reliability, due to the extensive grade-separated segment from Avenida Pico to the southern city limits. In addition, operational and maintenance costs would be reduced by getting the tracks away from the beach. This alternative would require a twin-bore tunnel over 6 miles in length, and therefore would be considerably more costly than the Short Trench alternative (an estimated \$500 million more). Nevertheless, in spite of its cost, the Short Tunnel is assessed to have a positive cost-effectiveness because of the train performance benefits that result from this option.

The Short Tunnel option would have community benefits and reduce environmental impacts. The Short Tunnel option would reduce the “barrier effect”, improve coastal access and beach aesthetics, and significantly reduce noise and vibration issues and coastal bluff impacts by resulting in the removal of the track along the beach at San Clemente. However, this option could have property impacts on as many as 15 acres of non-residential land, as acquisition of right-of-way easements from property (mostly commercial) would be required for the short tunnel segment beneath the transition from I-5 to the LOSSAN corridor near Avenida del Pico, and the development of a new station.

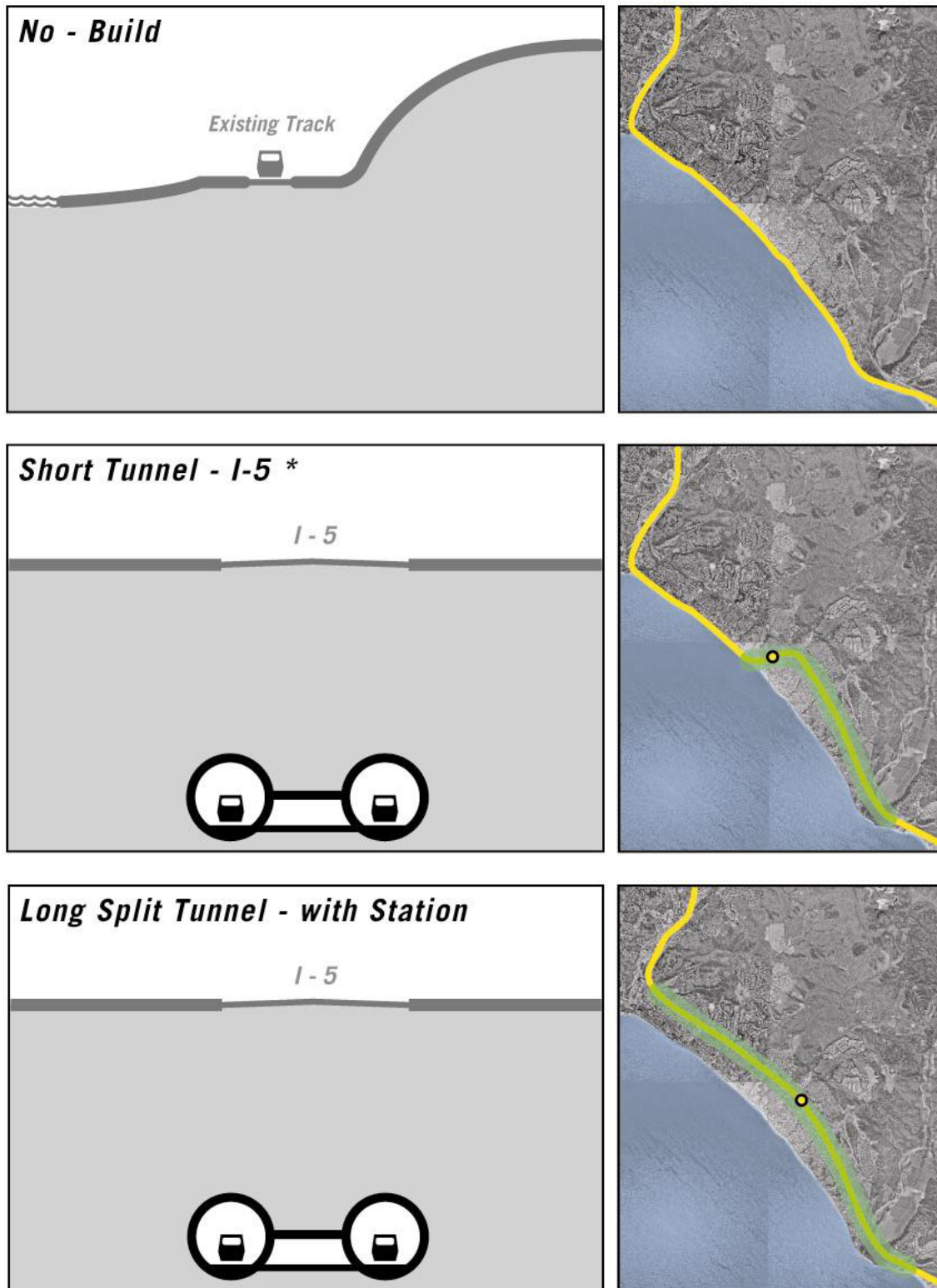
Although there are potential property impacts associated with Short Tunnel, the public is supportive of this concept to remove the existing track from the beach in San Clemente.

**Long Split Tunnel - with Station:** This option is similar to the Interstate 5 Long Tunnel option, except it would utilize two tunnels (rather than a single tunnel), which allows for a station in San Clemente. This option, bypasses both the sharp curve in Dana Point and the coastal environmental and pedestrian concerns in San Clemente. This option would transition from the existing right-of-way into a trench approximately 500 feet south of Avenida Aeropuerto in San Juan Capistrano, entering into a tunnel just before coming under the right-of-way of Interstate 5. The option would continue beneath Interstate 5, leaving the right-of-way just north of Basilone Road, exiting the tunnel and returning to grade level at San Onofre Creek, then rejoining the existing railroad right-of-way.

The Long Split Tunnel option would have the same performance benefits as the Short Tunnel option and even greater environmental and community benefits since this option would result in the complete removal of tracks from the coast. However, there are very significant construction challenges incumbent in this option that would require two tunnel segments (both twin-bore tunnels) exceeding 5-miles in length. Furthermore, this option is expected to cost over \$300 million more than the Short Tunnel option.

The Long Split Tunnel option would remove the existing rail line from the coastline, resulting in greatly improved coastal access and reduced barrier issues. Bluff impacts from trains would be eliminated. This option could displace up to eight acres of non-residential property, primarily in the area of the north portal in San Juan Capistrano, and between the tunnel segments at the station site. This option allows for a replacement rail station, near Avenida del Pico that could support both Metrolink and Amtrak service in San Clemente. The Long Split Tunnel option would greatly reduce noise and vibration impacts associated with rail service, and improve beach aesthetics.

Public acceptability for alignment options that would avoid the sensitive coastal areas has been strongly positive. Although it is a costly option, the Long Split Tunnel option is particularly attractive to the region since it would remove the tracks completely along the coast, through both San Clemente and Dana Point.



**Figure 6-8 – Options to be Retained for Further Study in San Clemente/Dana Point**

### Alignment and Station Location Options to be Eliminated from Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended to be eliminated from further evaluation (see Figure 6-9):

**Short Trench:** This option provides for double-tracking while following the existing railroad right-of-way. A short trench would be constructed through the San Clemente pier area to allow for safe pedestrian access across the tracks. Additional pedestrian under-crossings would also be constructed along the section of the corridor traveling at-grade on the beach.

The Short Trench option has severe construction impacts and high negative impacts to the environment and the community, yet offers only a marginal improvement to train service and performance.

Although the Short Trench option would increase track capacity (due to double tracking), it would provide no change in running times, no net improvements to safety, and no change to reliability. The Short Trench option offers significant constructability challenges, most notable the construction of the trench in the Pier Bowl and construction around Mariposa Point, while simultaneously maintaining access to the San Clemente Pier and existing rail service. The construction of the Short Trench option would also impact San Clemente businesses, which depend upon visitors to the beach. It has been assessed to have a low cost-effectiveness (based upon the benefits it provides and the impacts it imposes, compared to its cost).

The Short Trench option poses very significant constructability challenges, most notably because of the nature of the beach itself and the coastal bluffs (particularly at Mariposa Point – see Figure 6-9). Attempting to stabilize the beach and fragile coastal bluffs would require major construction efforts, including a 10-20 foot high seawall at the base of the bluffs, retaining walls within the trench itself, and tie-backs at the top of the bluffs, resulting in drastic changes to the existing environment. The use of heavy construction equipment in this sensitive beach and coastal bluff environment would also be problematic. Moreover, the constrained space available for construction of the trench and the need to maintain rail service during construction would create significant impacts.

The Short Trench option would have the highest environmental impacts. The covered portion of the trench would improve coastal access and reduce the barrier effect of the rail corridor in the Pier Bowl area. Other areas, where the trench was open or in transition would have greatly reduced access opportunities. Coastal access during construction would be greatly constrained in the Pier Bowl area. The Short Trench option reduces the barrier effect of the existing rail corridor through the downtown area, by providing a covered trench. However, this option would do little to reduce or remove the impact of the rail corridor on adjacent residential uses. Additionally, the barrier effect between residential and recreational uses would increase as a result of the trench. The Short Trench option would impact beach aesthetics by imposing new concrete structures (the trench and its transitions) on the beach. The Short Trench option would not remove the rail line from the beach, but rather would submerge it into the beach, creating new, different impacts (including the need for the stabilization methods noted above). The beach and bluff impacts of the Short Trench concept would result in the highest impacts on natural resources and have major geological and soils constraints. Construction on the beach and bluffs would have high impacts to erodible soils, unstable slopes, and aesthetics and visual quality. Property impacts with the Short Trench option would

include the likely need to acquire property during the construction period in order to stage equipment and materials.

There is strong public support for removing this alternative from further consideration.

**Long Trench:** This option is similar to the Short Trench in that it would also remain largely within the existing railroad right-of-way, and would include curve straightening at Dana Point. The option would begin a bored tunnel through Mariposa Point, just south of the existing Metrolink station (at Avenida Pico and El Camino Real), then transition north of the pier into a cut-and-cover trench, which would continue until approximately 1,600 feet north of the San Diego County line.

Although the Long Trench option offers significant improvements to train service and performance, it has severe construction impacts and high negative impacts to the environment and the community, as well as high construction costs.

Like the Short Trench option, the trench's double track would provide increased train capacity. Unlike the Short Trench, the Long Trench option would improve running times, safety, and reliability, due to the extensive grade-separated segment from Mariposa Point to the southern city limits. The construction of the Long Trench option would also impact San Clemente businesses, which depend upon visitors to the beach. While more costly than the Short Trench option (estimated \$150 million additional cost), the Long Trench is assessed to have a positive cost-effectiveness as a result of the benefits to train performance.

The Long Trench option would reduce the "barrier effect", due to the covered trench and tunnel section. However, there would be access issues during the construction phase, especially along the beach and in the Pier Bowl areas. Coastal impacts would result from the Long Trench option, as tunneling under the bluffs at Mariposa Point would be required. Property Impacts would be significant, as acquisition of property would be required for the tunnel segment beneath the residential subdivision at Mariposa Point. Noise and Vibration issues would be minimized as a result of the trench (and greatly reduced in the tunnel segment of the Long Trench).

The Long Trench option poses significant constructability challenges, most notably because of the nature of the beach itself and the coastal bluffs (particularly at Mariposa Point – see Figure 6-10). The use of heavy construction equipment in this sensitive beach and coastal bluff environment would also be problematic. Moreover, the constrained space available for construction of the trench and the need to maintain rail service during construction would create significant impacts.

The Long Trench option would have high environmental impacts. The covered portion of the trench would improve coastal access and reduce the barrier effect of the rail corridor in the Pier Bowl area. Other areas, where the trench was open or in transition, would have greatly reduced access opportunities. Coastal access during construction would be greatly constrained in the Pier Bowl area. The Long Trench alternative would impact beach aesthetics by imposing new concrete structures (the trench and its transitions) on the beach. The Long Trench option would not remove the rail line from the beach, but rather would submerge it into the beach, creating new, different impacts (including the need for the stabilization methods noted above). The beach impacts of the Long Trench concept would result in high impacts on natural resources and have major geological



and soils constraints. Construction on the beach and bluffs would have high impacts to erodible soils, unstable slopes, and aesthetics and visual quality. Property impacts with the Long Trench option would include the likely need to acquire property through the residential community at Mariposa Point and during the construction period in order to stage equipment and materials.

There is strong public support for removing this alternative from further consideration.

**Long Single Tunnel (No Station):** This option is similar to the Interstate 5 Long Tunnel with station, except it would utilize a single (rather than split) tunnel, which does not allow for a station in San Clemente. Like the Long Tunnel with Station option, the new alignment bypasses both the sharp curve in Dana Point and the coastal environmental and pedestrian concerns in San Clemente. This option would leave the existing right-of-way in a trench approximately 500 feet south of Avenida Aeropuerto in San Juan Capistrano, entering into a tunnel just before coming under the right-of-way of Interstate 5. The option would continue beneath Interstate 5, leaving the right-of-way just north of Basilone Road, exiting the tunnel and returning to grade level at San Onofre Creek, then rejoining the existing railroad right-of-way

The Long Single Tunnel option would have many of the benefits and impacts as the Long Split Tunnel option. However, there are very significant additional construction challenges incumbent in this option. A single tunnel more than 6 miles in length is much more expensive, and difficult to construct than the split tunnels proposed in the Long Tunnel (with station) option. The Long Single Tunnel option, that requires a single twin bore tunnel exceeding 11-miles, is expected to cost at least \$400 million more than the Long Split Tunnel option. Furthermore, this extremely long tunnel would require several large ventilation shafts to the surface and may require cross-overs to be constructed between the two twin bore tunnels.

Public acceptability for alignment options that would avoid the sensitive coastal areas has been strongly positive; however this option would offer no opportunity for rail service in San Clemente.



**Figure 6-9 – Options to Be Eliminated from Further Consideration in San Clemente/Dana Point**





**Figure 6-10 – Existing Rail Corridor at Mariposa Point**

## 6.6 SAN JUAN CAPISTRANO

A number of design options exist in the city of San Juan Capistrano, including the “No-Build” (maintaining the existing conditions) option, two covered trench (Cut-and-Cover tunnel) options, and one tunnel option, as shown below:

- No-Build
- Downtown Cut-and-Cover Tunnel
- Trabuco Creek Cut-and-Cover Tunnel
- Interstate 5 Tunnel

The following subsections provide descriptions of the each of the options in San Juan Capistrano (except for the No-Build option), and the recommendation of whether the option be carried forward for further evaluation or eliminated. (It is important to note that the “No-Build” option represents the existing conditions and will always be carried forward for further consideration)

### Alignment and Station Location Options Carried Forward for Further Evaluation

Based on information obtained through the technical evaluations and public input, the following alignment options are recommended for further evaluation (see Figure 6-11):

**I-5 Tunnel:** This option would bypass the downtown area of the City of San Juan Capistrano completely by realigning the railroad right-of-way beneath Interstate 5. The new alignment would begin near State Route 73, where the tracks would begin entering a trench. The alignment would then leave the existing right-of-way, entering a twin-bored tunnel. The alignment would then pass beneath Trabuco Creek, Camino Capistrano and Junipero Serra Road before proceeding beneath the Interstate 5 right-of-way. The alignment would leave the right-of-way of Interstate 5 at San Juan Creek Road, passing beneath Camino Capistrano and exiting the tunnel north of Avenida Aeropuerto, where it would rejoin the existing LOSSAN corridor. This option accommodates the possibility of retaining the existing single-track line and service through downtown San Juan Capistrano.

The I-5 Tunnel option provides major benefits to train performance and could benefit historical resources by moving at least the intercity and freight services away from the downtown historical district.

The I-5 Tunnel option would greatly increase track capacity, due to double tracking. This tunnel concept would reduce running times, improve safety, and increase reliability due to its completely grade-separated configuration. However, this option has significant constructability challenges with a 3-mile twin bore tunnel configuration under I-5, and is expected to cost about \$400 million more than a Downtown Cut and Cover Tunnel option. For these reasons, it has been given a negative cost-effectiveness rating. There would not be an intercity station provided along the I-5 tunnel bypass of San Juan Capistrano.

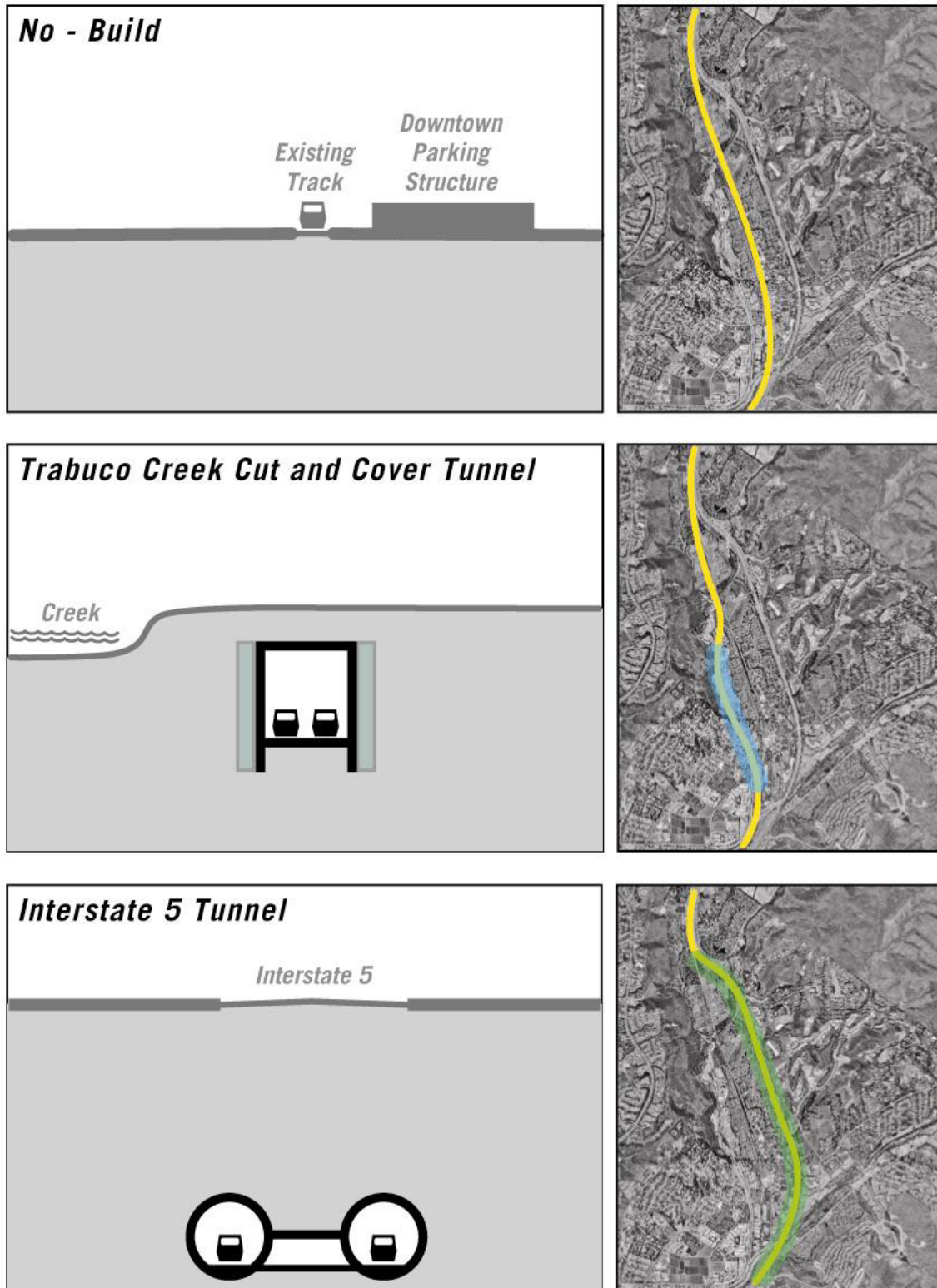
The public acceptability of this option, as determined by comments and feedback from previous public meetings, is mostly positive. The City of San Juan Capistrano has requested that this alignment option continue to be considered, but has also requested that this option maintains the existing rail line as a spur track to retain local service.

**Trabuco Creek Cut and Cover Tunnel:** This option would realign the existing alignment through San Juan Capistrano's downtown to the west, loosely following the east bank of Trabuco Creek. Starting approximately at Junipero Serra Road, the alignment would veer west away from the existing alignment. It would then transition into a covered trench and provide a replacement station due west of the existing station, before proceeding under Del Obispo. From here, the option would transition back to grade, either by remaining on the east bank of Trabuco Creek or by turning back to the existing LOSSAN alignment, before crossing San Juan Creek.

The Trabuco Creek Cut and Cover Tunnel option was suggested for investigation by the City of San Juan Capistrano as a design refinement of the Downtown Cut-and-Cover Tunnel option, at the March 4, 2003 OCTA agency meeting for the LOSSAN technical studies. This option provides the benefits of the Downtown Cut and Cover Tunnel option (increased track capacity, reduced running times, improved safety, and increased reliability), while at the same time it would move construction of the cut-and-cover tunnel to the western edge of San Juan Capistrano's historic district reducing the potential for construction impacts, as well as eliminating the need for the demolition and reconstruction of the downtown parking garage adjacent to the existing depot. This option would also provide for the construction of a new passenger rail station (and possible multimodal facility) in downtown San Juan Capistrano. This option would include a grade separation at Del Obispo Street, removing a major traffic network bottleneck that can occur when trains are passing through the intersection.

Public acceptability of this option is positive, as determined by comments and feedback from recently held public workshops. The conceptual engineering plans and profiles have been developed for this option and are available for public review.





**Figure 6-11 – Options Retained for Further Consideration in San Juan Capistrano**

### **Alignment and Station Location Option to be Eliminated from Further Evaluation**

Based on information obtained through the technical evaluations and public input, the following alignment option is recommended to be eliminated from further evaluation (see Figure 6-12):

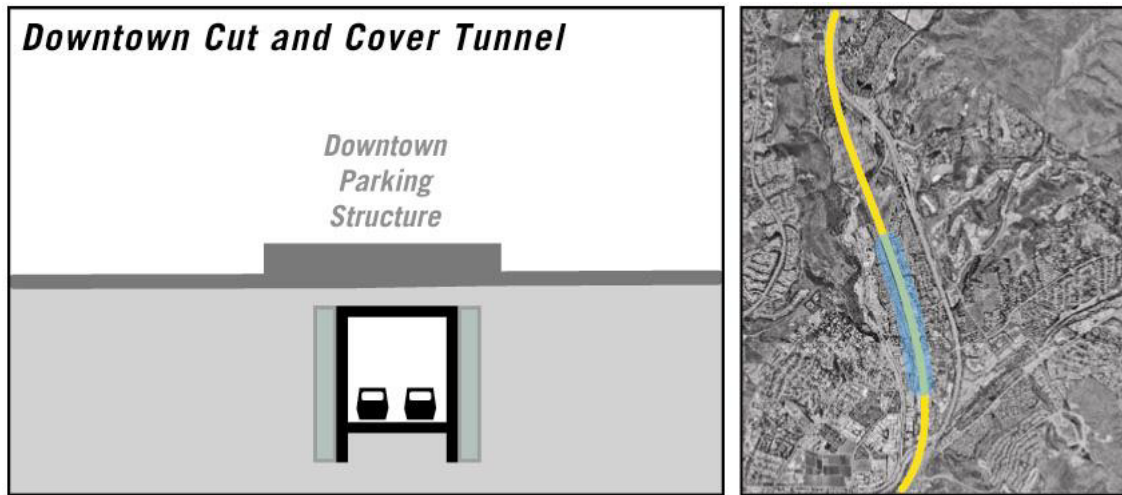
**Downtown Cut-and-Cover Tunnel:** This option would construct a cut and cover tunnel through San Juan Capistrano's downtown. Near Junipero Serra Road, the alignment would enter a double-tracked open concrete trench. North of the existing San Juan Capistrano Depot, the trench would become a covered trench. The covered trench would pass beneath an existing downtown parking structure, and then would become an open trench again. Near San Juan Creek, the alignment would return to grade. This option would also include curve straightening the alignment just south of the San Juan Creek crossing.

The Downtown Cut-and-Cover Tunnel would have severe construction impacts and property impacts on Downtown San Juan Capistrano and the historic district, and would have negative impacts on the community, and historical resources.

This option would increase track capacity, reduce running times, improve safety, and increase reliability. However, this option would have major constructability impacts, because of limited available right-of-way in the historic district, the close proximity of sensitive historic and cultural resources (including the historic downtown station), the need to maintain rail service during construction, and the need to demolish and replace the existing downtown parking structure and surface parking facilities (causing significant disruption to the downtown business community during construction). For these reasons, it has been given a negative cost-effectiveness rating.

Historical resources could be directly impacted with this option, largely during construction. Property impacts would be very high in this option, as property would need to be acquired for right-of-way, and businesses would be impacted during construction, particularly as a result of the demolition of the parking structure (which would be rebuilt after the covered trench had been constructed). There would be noise and vibration impacts, both during construction, and in areas of open trench after construction.

The public acceptability of this option, as determined by comments and feedback from previous public meetings, is extremely negative. The City of San Juan Capistrano is on record as being opposed to this option, and has asked that it be eliminated from further consideration. They believe the construction of this option would have long-term detrimental effects on the community. For reasons of cost, constructability, cost-effectiveness, potential impacts to historical resources and property, as well as public acceptability, it is recommended that this option be eliminated.



**Figure 6-12 – Option to Be Eliminated from Further Consideration  
in San Juan Capistrano**



## 7.0 COMMUNITY ISSUES AND CONCERNS

As part of the Strategic Plan's development, five Public Workshops were held. The workshops provided the public with an overview of the corridor and the rail improvements under study, including information on:

- The purpose and goals of the Strategic Plan
- The need for improvements to the corridor
- Current and projected weekday train volumes
- Corridor facts, including rail owners and operators and details on Freight services
- Types of rail services provided (Intercity Rail, Commuter Rail, and Freight)
- The Strategic Plan timetable
- Ranges of costs, rail performance issues, and community/environmental issues of projects throughout the corridor
- Design options and alternatives at four key locations along the corridor where the range of options was sufficiently broad to allow the screening out of some options, the recommendations for screening, and the rationale and criteria used to reach the recommended screening decisions.
- The Planning Process, including timelines for the completion of the Strategic Plan, and both the Department and Authority's Draft Program-level Environmental Impact Reports/Environmental Impact Statements.

Public Workshops were held over five evenings, in the following locations, according to the schedule listed below:

City	Date	Time	Location
City of Encinitas	March 25, 2003	6:00 – 8:00 p.m.	Community & Senior Center, 1140 Oakcrest Park Dr.
City of San Diego	March 26, 2003	6:00 – 8:00 p.m.	Caltrans District 11, 2829 Juan Street
City of Anaheim	March 27, 2003	6:00 – 8:00 p.m.	City Hall West, 201 South Anaheim Boulevard
City of San Clemente	April 2, 2003	6:30 – 8:30 p.m.	Community Center, 100 North Calle Seville
City of Norwalk	April 3, 2003	6:00 – 8:00 p.m.	Norwalk Marriott, 13111 Sycamore Drive

Attendance at the workshops was good, with more than 500 persons total at the workshops, with the bulk of this attendance at the April 2<sup>nd</sup> San Clemente meeting. Attendees were asked to complete surveys, designed to assess their issues and concerns regarding the proposed LOSSAN corridor improvements and the recommended options screening. A total of 326 surveys were completed and returned. The majority of the surveys returned were from the San Clemente meeting, and thus reflective of the issues in that community.

The surveys consisted of six questions. While concerns continue to be expressed about individual options, survey responses were generally positive and supportive of the screening recommendations, and reflected the concerns of the communities at which the

Public Workshops were held. At the San Clemente meeting, for example, surveys showed strong support for a tunnel option that would relocate the tracks off the beach. Conversely, respondents at the Encinitas meeting indicated the importance of grade separations and lagoon restoration.

The goals of the Public Workshops were to provide the public with information and facts about the corridor, its types of rail service, current and projected levels of weekday train volumes, and the proposed rail improvement projects, timing, potential impacts and benefits, and recommendations for screening, and to solicit their involvement and opinion. While some concerns remain about remaining options and project timelines (particularly in the South Orange County area), as the Strategic Business Plan and Program-level EIR/EIS move forward, it appears that the public is “on board” with the recommendations made.

Following the Public Workshops, on March 25, 2003, the Authority presented to its Board the Screening Recommendations for the LOSSAN corridor as an information item.

At that meeting a substantial number of persons spoke on behalf of the recommendations presented, and their comments incorporated into the official record of the meeting, including San Diego County Supervisor Pam Slater, the mayor and vice-mayor of San Clemente, Dana Point city manager, as well as representatives from the Surfrider Foundation, Del Mar Lagoon Committee, Orange County Transportation Authority, and San Diego Association of Governments (SANDAG).

The speakers noted that the alternatives presented have met the concerns of communities along the corridor, helping to achieve consensus and support for the project. There was unanimous support of the screening recommendations. Speakers from South Orange County also called for the elimination of the Short Tunnel option, due to potential impacts to a planned desalination plant at San Juan Creek, and to the Marblehead development in San Clemente.

In addition to the Public Workshop surveys and comments received at the March Board meeting, nearly one hundred postcards and letters have been received by the Authority, expressing support for the screening recommendations as presented at the Public Workshops and March 27<sup>th</sup> CHSRA Board meeting.

In addition to the Public Workshops, the development of the Strategic Plan included continuing consultation and meetings with representatives of cities along the corridor, transportation agencies and rail operators. Working groups of stakeholders were formed in San Diego and Orange Counties (including the previously mentioned cities and organizations) and met throughout the process to provide comment and feedback on the evolving Strategic Business Plan. The recommendations in the Strategic Plan have the support of both working groups.

Lastly, resources agencies at the state and federal level were involved at every stage of the Strategic Plan, and provided their comments and feedback on the criteria to be used in the evaluation of options and the screening recommendations. The recommendations presented here have been reviewed by the resources agencies, and have their support.

## 8.0 A TIMELINE OF LOSSAN CORRIDOR RAIL IMPROVEMENT PROJECTS

The following section provides brief descriptions of the proposed rail improvements along the LOSSAN Corridor, beginning in the south (at San Diego's Santa Fe Depot) and working northward to Los Angeles Union Station. A detailed analysis of these improvements will be accomplished during the preparation of the Project EIR/EIS and will be provided in that document.

In addition to the descriptions of the projects under consideration, a draft timeline for the advancement of the projects has been created. The timelines discussed in this section are suggested time periods for projects to complete their required environmental clearance, preliminary design and permitting, final design and construction, subject to the availability of funding. This time frame is divided into three ranges: short-term, medium-term and long-term. The time periods are measured from the time following the publication of the Department's Final Program Environmental Impact Report/Environmental Impact Statement.

### Short-Term

Short-term refers to the period 1 to 3 years following the publication of the Final Program EIR/EIS. Work undertaken within this time period could include environmental clearance, preliminary design and permitting, or final design and construction. Depending on the complexity and location of the project, it could include all three. As a representation of what could be accomplished over the three periods, the examples shown indicate the timeline for a project's final construction. Examples of potential projects that could be categorized as short-term include:

#### Project-Specific Environmental Documentation

- Dana Point and San Clemente options
- Oceanside to Carlsbad Double-tracking and Grade Separations
- Encinitas Double-tracking and Grade Separations
- Del Mar options
- SR-52 to San Diego tunnel options

#### Permitting and Final Design

- Double Tracking through Camp Pendleton

#### Construction

- Los Angeles Union Station Run Through Tracks (through to construction)
- Double Tracking through Camp Pendleton (through to construction)

The run through tracks at Union Station are already undergoing a Project Specific environmental review.

Medium-Term

Medium-Term refers to the period 4 to 6 years following the publication of the Final Program EIR/EIS. Potential projects that could be categorized as medium-term include:

Project-Specific Environmental Documentation

- Fourth Track – Commerce to Fullerton
- San Juan Capistrano options

Permitting and Final Design

- Dana Point and San Clemente options
- Fourth Track – Commerce to Fullerton

Construction

- Double Tracking and Grade Separation through Oceanside and Carlsbad
- Double Tracking and Grade Separation through Encinitas
- Double Tracking and Grade Separation from Rose Canyon to downtown San Diego (partial)

Long-Term

Long-Term refers to the period more than 7 years following the publication of the Final Program EIR/EIS. Examples of potential projects that could be categorized as long-term include:

Project-Specific Environmental Documentation

- Fullerton to Irvine Double-tracking, Curve Straightening, and Grade Separations

Permitting and Final Design

- San Juan Capistrano options

Construction

- San Juan Capistrano options
- Fullerton to Irvine Double Tracking, Curve Straightening and Grade Separations
- Double tracking and Grade Separation – Carlsbad to Oceanside
- Del Mar options
- Tunneling under Miramar Hill
- Complete Grade Separation from Rose Canyon to downtown San Diego

Exhibits 8-1 and 8-2, included in this section (Strategic Plan Timeline and Strategic Plan Costs/Performance, respectively) provide a graphical reference for the description of projects in the subsections below. The exhibits also show:

- Generalized costs of each project (in millions of dollars)
- Benefits or impacts to train service and performance
- Additional miles of double track added as a result of the project
- Number of curves eliminated
- Generalized level of community and environmental issues (and the primary nature of these issues)
- The project's phaseability

Generalized costs are provided for each project. The final estimated costs of a project depend on a number of factors, and are outside the scope of this Program-level document. Instead, costs are shown as "less expensive or more expensive", so that projects may be compared one with another.

Depending on its nature or length, a project may have differing impacts or benefits to train service and performance. The relative benefit on performance is shown for each project.

Double tracking is a key element of the proposed rail improvement projects. Similar to increasing the number of lanes on a roadway, addition of a second mainline track would permit trains to pass in either direction without making one train wait for the second to exit a single-tracked section of the corridor. Each project area's description includes additional miles of double track added in a project area.

Tight curves along the rail corridor require trains to slow in order to negotiate them safely. This reduction in speed translates to increases in travel time. The elimination of these operational constraints (through "curve straightening" - realignment of the rail line to allow for more gentle curves) would produce significant benefits to train service and performance. The number of curves that would be eliminated with each project is shown.

Generalized information on the major community and environmental issues likely to be faced in the project area is noted.

Phaseability relates to whether or not a project may be constructed in discrete segments over time. Certain projects (tunnels, for example) must be completed in their entirety and are not phaseable, whereas other rail improvements (such as double tracking or grade separations) can be constructed in sections. The relative level of phaseability (Phaseable, Less Phaseable, or Not Phaseable) for each project area is given.

## **8.1 San Diego County**

### **Description of Projects**

**Area: San Diego (between San Diego Santa Fe Depot and State Route 52)**  
**Double Tracking and Curve Straightening (including partial or full grade separation)**

This project would provide for double tracking, curve straightening and the construction of a trench beginning just north of San Diego Santa Fe Depot. This new open and covered trench would allow for the grade separation of a number of closely spaced streets (including Beech, Cedar, Fir, Grape, Hawthorne, Laurel, and Palm), in the Downtown, Middletown and Old Town neighborhoods. Other streets in this area receiving grade separation include:

- Sassafras St. – New undercrossing
- Vine St. – New undercrossing
- Washington St. – New undercrossing
- Noell St. – New undercrossing
- Rosecrans Blvd./Taylor St. – New undercrossing

As well, new double-track bridges over the San Diego River and Tecolote Creek, and realignment of the Elvira curve would be improvement projects undertaken within this area.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design Construction (some portions)	Construction (remaining portions)



**Area: University Towne Centre (San Diego)**  
**Double Tracking and Curve Straightening (including tunnel under University City w/new station, or tunnel under I-5)**

Projects in this area would provide expanded double tracking, curve straightening and the construction of a tunnel (under University Towne Centre, or under the I-5 freeway right-of-way). Either tunnel would dramatically reduce the train performance impacts and reduced speeds of the existing corridor as it winds through Miramar Canyon (eliminating 12 curves in the process!). Both tunnels would transition to a covered trench and a return to the existing LOSSAN corridor alignment near the Sorrento Valley Coaster station. The possibility of a new multimodal facility in University City could offer a new Amtrak Pacific Surfliner passenger rail stop, as well as provide for a new commuter rail station and provide for increased intermodal connectivity with transit and Bus Rapid Transit/Light Rail in University City (a major employment center and dense residential neighborhood located near the campus of the University of California at San Diego).

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design	Construction

**Area: Del Mar**  
**Double Tracking and Curve Straightening (via a Tunnel, either beneath Camino Del Mar, or beneath the I-5 Freeway right-of-way)**

Section 6.2 discusses Del Mar project options in detail. In addition to the projects mentioned in the detailed design option discussion is a new double-tracked bridge over the San Dieguito River (adjacent to the Del Mar Fairgrounds).

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design	Construction

**Area: Encinitas**

**Double Tracking and Curve Straightening along existing alignment  
(including partial or full grade separation)**

Section 6.3 discusses this area's project options in detail. In addition to the projects discussed there, new double tracking would be constructed north of the San Dieguito River. As well, new double-tracked crossings over the San Elijo and Batiquitos lagoons would be constructed in this area. Like other lagoon crossings in San Diego County, these new concrete structures would have a beneficial impact on the lagoons, allowing for the removal of old structures and reduction of berms.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design Construction (some portions)	Construction (remaining portions)

**Area: Carlsbad to Oceanside**

**Double Tracking and Curve Straightening along existing alignment  
(including partial or full grade separation)**

Projects in this area would provide expanded double tracking, curve straightening along the existing alignment. New, double-tracked crossings over Aqua Hedionda and Buena Vista lagoons would provide an opportunity for increased tidal flow, and reduce lagoon impact through the removal of the existing structures (and their accompanying creosote-piles and berms). New, double-tracked bridges would be constructed over Alta Loma Creek and San Luis Rey River. Finally, the siding near Oceanside Transit Center would be extended as part of improvements to the corridor in this area.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design Construction (some portions)	Construction (remaining portions)

**Area: Camp Pendleton****Double Tracking along existing alignment**

Within the Camp Pendleton area a second mainline track would be constructed within the existing right of way from Control Point (CP) Pulgas to CP Ocean. Given that the improvements would be performed within the existing right-of-way, it is likely that all phases of the environmental assessment, design, and construction could be completed within the Short-term.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering Permitting and Final Design Construction		

## 8.2 Orange County

### Description of Projects (by Area)

#### **Area: San Clemente/Dana Point**

#### **Double Tracking and Curve Straightening (via Tunnel)**

Project options in San Clemente and Dana Point are discussed in detail as part of Section 6.5. As noted, the Long Split I-5 Tunnel would provide for a new intercity/commuter rail station at Avenida Pico. Existing at-grade crossings at Senda de la Playa in San Clemente, and Beach Road in Dana Point would be eliminated as part of the suggested improvements.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design	Construction

#### **Area: San Juan Capistrano**

#### **Double Tracking and Curve Straightening (via Tunnel beneath the I-5 Freeway right-of-way or a Cut and Cover Tunnel along Trabuco Creek)**

Project options in San Juan Capistrano are discussed in detail as part of Section 6.6. As part of the Trabuco Creek alignment option, a new grade separation at Del Obispo would be provided. As part of the I-5 Freeway option (should no rail spur be maintained to the existing Depot), the at-grade crossing at Cassidy would be eliminated.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design	Construction

#### **Area: San Juan Capistrano to Irvine**

#### **Track and Signal Upgrades**

Just north of San Juan Capistrano the existing corridor is already double-tracked to Irvine. In this area minor upgrades to track and signal equipment would be made.

**Area: Irvine to Fullerton**

**Double-Tracking and Curve Straightening, including partial or full grade separation**

The area between Irvine and Fullerton contains areas of existing double tracking, as well as areas where the corridor continues to have a single track. There are a number of at-grade crossings within this section, which would receive partial or full grade separation.

Given the urbanized nature of the area in which these improvements would be located, it is likely that they would be implemented over the Long-term.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
		Project-specific Environmental Documentation and Preliminary Engineering Permitting and Final Design Construction

### 8.3 Los Angeles County

#### Description of Projects

##### **Area: Fullerton to Commerce**

##### **Addition of Fourth Main Track**

The addition of a fourth main track would extend from the City of Commerce, just south of BNSF's Hobart Yard to Fullerton Junction in North Orange County. This project would require the acquisition of additional right-of-way along the corridor, but would incorporate full grade-separation with all major arterials crossed in both Los Angeles and North Orange Counties.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering	Permitting and Final Design	Construction

##### **Area: Union Station (Los Angeles)**

##### **Run-through Tracks**

Union Station currently uses a stub-end track configuration, meaning that trains enter and leave the station via the same set of tracks. Construction of run-through tracks at Union Station would speed the dispatching of trains and provide for more access to train platforms. The project is currently in the environmental assessment and preliminary engineering phase.

Short-term (1-3 years)	Medium-term (4-8 years)	Long-term (7+ years)
Project-specific Environmental Documentation and Preliminary Engineering Permitting and Final Design	Construction	



## 9.0 FUTURE PLANNING PROCESS

The Strategic Plan represents one phase of the Department's continuing study of LOSSAN corridor rail improvements.

The Strategic Plan has been developed over a period of time in a very consultative manner, involving the public, cities along the corridor, transportation and resource agencies, rail owners and operators, and planning partners at the state and federal level. Following an review by corridor transportation agencies and rail working groups, the Strategic Plan will be released to the public as a Draft document. After a period of comment and revision, the Revised Draft will be accepted by the Department as a final document, and complementary adjunct to the Program-level EIR/EIS process.

Subject to state budgetary constraints, the planning process for the Proposed Rail Corridor Improvement Studies will continue over the next several months, leading to the release of the Department's Draft Program-level Environmental Impact Report/Environmental Impact Statement (PEIR/PEIS) in the Spring of 2004.

Following the release of the Draft document, the public will have an opportunity to review and comment on the document for a period, leading up to its revision, acceptance and scheduled release as a Final document in Fall 2004. As has been mentioned previously, no rail improvement projects will be built as a result of the Strategic Plan or the PEIR/PEIS. These documents will provide the underlying basis and justification for future planning documents, which will be tiered off from this document, on a project-specific basis, subject to budgetary and funding opportunities. Project-specific environmental clearances will go into significantly more detail, as required by state and federal law.

# **APPENDIX A - EXCERPTS FROM ENVIRONMENTAL TECHNICAL REPORTS**

## **Coastal Bluff Stabilization and Construction Issues in the LOSSAN Corridor**

### **SLOPE STABILITY**

Failure of adjacent natural slopes and/or construction cut slopes or retention structures is a concern in the Del Mar and San Clemente areas of the LOSSAN Corridor conventional rail alternatives. The following is a general discussion of areas along the proposed corridor identified as unstable (specifically, the trench alternatives along the beach/coastal bluffs in Del Mar and San Clemente), and potential measures that would have to be considered in order to achieve long-term stability of the proposed rail corridor improvements (Leighton & Associates 2003).

#### Existing Stabilization Methods

A number of remedial or stabilization measures exist along the existing railway in the vicinity of the proposed rail corridor improvements. These include older improvements along the coastal bluff face through the cities of Del Mar and San Clemente that are in need of ongoing repair and or maintenance. For example, in Del Mar, wooden and concrete seawalls along portions of the bluff are currently protecting portions of the base of the bluff against erosion due to typical wave impact. However, these walls are occasionally of insufficient height to block heavy storm surf or at least require periodic maintenance to remain effective. In San Clemente, the existing rip-rap berms also requires maintenance. Other facilities that need ongoing maintenance include the storm drain and subdrain facilities along the bluffs in Del Mar and San Clemente. These include engineered but undersized facilities, drains rendered inoperable due to lack of maintenance, and un-engineered facilities, commonly temporary in nature, such as those installed by property owners upslope of the bluffs in San Clemente. In several locations, these drains were observed to be leaking and causing surface erosion and infiltration of water into the underlying soils.

Such existing conditions must be taken into account even where relatively minor construction is proposed as part of a given rail corridor improvement. Potential slope reinforcement and protection measures that may be needed are discussed below.

#### Stabilization of Bluff Toes

In areas where increased erosion could result in significant damage (i.e., erodible materials, such as compacted fill soils), stabilization at the bluff toe should be considered. Stabilization measures at the bluff toe can serve to preserve or increase lateral support. Methods for stabilization include wooden and concrete sea walls, steel piles and wood lagging walls, sand cement revetment, rock revetments, and beach replenishment. Details for sea wall construction, rock revetment details, and beach replenishment, are beyond the scope of this report, but are discussed in a site specific report on the Del Mar Bluffs (Leighton, 2001a).

#### Stabilization of Bluff Faces

In areas where the erosion or failure of the existing seacliff would impact the proposed rail alignment by undermining the foundation or by deposition of debris from upslope areas, stabilization of the bluff face must be considered. Slope grading can be performed to stabilize the bluff and re-establish eroded and failed areas, as was done previously at several locations along the coastal rail route through San Clemente and Del Mar (Leighton & Associates 2003).

Where sufficient railway right-of-way is available, slope grading would generally consist of the placement of compacted fill soils on the face of the slope to provide additional lateral support, flatten localized over-steepened areas, and allow for the removal of existing slope failures. Typical grading would start by establishing a key at the base of the area to be filled that extends into competent material. A subdrain

could be placed at the back of the key to minimize future groundwater accumulation and at selected higher elevations during the site grading. A typical fill slope would be constructed at a 2 to 1 (horizontal to vertical) inclination with compacted fill soils. With some of the constraints of the site, steeper slopes may be desirable in order to maintain existing beach widths or to minimize grading. Steeper slopes can be constructed by the incorporation of geogrid reinforcement into the compacted fill soils or by the use of a soil-cement mixture.

Other mitigative measures for improving surficial slope stability are available in confined property areas requiring steeper as-built facilities. These include sand-cement buttresses, pipe and board retaining walls, and veneered tie back walls.

#### Stabilization of Bluff Tops

Where the tracks are located up-slope, without adequate setback from an unstable bluff face, or where further erosion would reduce this setback to an unreasonable distance, additional bluff top stabilization would be needed. Where other concerns preclude disturbance outside the right of way, stabilization of the tracks from the bluff top may be desirable. A series of soldier piles may be considered for support of the track bed. Soldier piles generally consist of a series of concrete encased I-Beams placed in a row adjacent to the track. They may be used in conjunction with tie-backs as a versatile stabilization method (Leighton, 2001a). The tie-back system may also be utilized for the repair of over-steepened portions of the bluff. If a tie-back system is proposed on the bluff face, architectural wall facing could be sculpted with colored concrete to afford the wall a natural appearance.

#### Drainage Improvements

Drainage over coastal bluffs occurs by both sheet flow and by earthen swales. Standing water observed along isolated areas adjacent to the existing rail alignments appears to be a combination of surface runoff and groundwater seepage that is generated by irrigation of upslope properties, and blocked by debris and soil creating localized areas of ponding. In other areas storm drains and subdrain outlets discharge on or near the top of slope creating an influx of water and increasing erosion. Some of the storm drain outlets leak and are in need of repair, and others simply discharge directly at the top of bluff. Improvements have already been made in some areas along coastal San Clemente; however, existing subdrains or stormdrains can be under-designed. Any proposed subsurface drainage system should be finalized after additional evaluation of possible water sources and depths.

#### Groundwater Reduction

Subsurface drainage is a major problem along coastal bluffs and a reduction of subsurface water would greatly improve the geotechnical conditions. The source of the water includes infiltration from surface runoff, but the majority of the water comes from other influences upslope which likely cannot be controlled or eliminated. These sources include surface sources that may be collected and directed to the storm drain system but the majority of the water is likely the result of upslope infiltration of irrigation and storm water. The water flows as perched water through the relatively permeable surficial geologic units that overlie the formational materials below and as localized seepage zones within the formation where sandy zones or fracture systems are present. Specific dewatering methods, including installation of subdrains, dewatering wells, and horizontal drains, slurry walls, cut off walls and soil mixing of saturated zones should be addressed in site-specific design studies. The selection of a preferred dewatering method should be based in part on additional site investigations and ground water modeling.

**SEA LEVEL RISE**

Global warming and rising sea levels have become a growing concern as a coastal hazard. Current projections estimate that a rise in sea levels of 19 inches could occur by the year 2100 (with a possible range of 5 to 37 inches). The slope stability issues in the coastal bluff areas in Del Mar and San Clemente described above would be exacerbated in the future by rising water levels and storm surges. Such conditions would have a direct impact on beach erosion and on storm-protection and stabilization structures along the rail infrastructure on the coastline.

**Table 4.0**  
**Analysis/Comparison Table**  
**Impacts to Cultural Resources**  
**Los Angeles – Orange County – San Diego Region**

For each of the four locations in which screening recommendations are being made (San Juan Capistrano, San Clemente/Dana Point, Encinitas, and Del Mar), Table 4-0 shows the number of known archaeological sites located near each alignment option; the percentage (based on miles) of each alternative route that passes through areas originally developed during historical time periods; whether or not “traditional cultural properties” (sites that are have some demonstrated importance to the local Native American community) are present; and lastly, an overall ranking of the potential sensitivity of the alignment in regard to cultural resources.

	Number of Archaeo- logical Sites	Percentage of Route Developed During Historic Periods			Traditional Cultural Properties (Yes/No)	Overall Ranking (High, Medium, Low)
		<1900	1900-1929	1930-1958		
1.1.1.1.1.1 Alignments						
San Juan Capistrano – (San Juan Capistrano City Limits to Avenida Aeropuerto) – Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	19	10.5	15.0	20.5	0	High
San Juan Capistrano (San Juan Capistrano City Limits to Avenida Aeropuerto) – TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	8	1.0	15.0	20.5	0	Medium
San Juan Capistrano (San Juan Capistrano City Limits to Avenida Aeropuerto) AT-Grade/Open TRENCH along east side of Trabuco Creek	2	1.0	15.0	20.5	0	High
1.1.1.1.1.2 Stations						
San Juan Capistrano Station – parking spaces OR parking spaces/bypass tracks	6	10.0	45.5	25.0	0	High
1.1.1.1.1.3 Alignments						



	Number of Archaeological Sites	Percentage of Route Developed During Historic Periods			Traditional Cultural Properties (Yes/No)	Overall Ranking (High, Medium, Low)
		<1900	1900-1929	1930-1958		
<b>Dana Point/San Clemente (Avenida Aeropuerto to San Onofre Power Plant) –</b> Dana Point Curve Realignment; San Clemente – SHORT TRENCH; Double Tracking	16	<0.1	2.0	35.5	0	High
<b>Dana Point/San Clemente (Avenida Aeropuerto to San Onofre Power Plant) –</b> Dana Point Curve Realignment; San Clemente – LONG TRENCH; Double Tracking	16	<0.1	2.0	35.5	0	High
<b>Dana Point/San Clemente (Avenida Aeropuerto to San Onofre Power Plant) –</b> Dana Point Curve Realignment; San Clemente – SHORT TUNNEL; Double Tracking	9	<0.1	2.0	36.0	0	Medium
<b>Dana Point/San Clemente (Avenida Aeropuerto to San Onofre Power Plant) ;</b> San Clemente – LONG ONE-SEGMENT TUNNEL; Double Tracking	6	<0.1	2.0	35.5	0	Medium
<b>Dana Point/San Clemente (Avenida Aeropuerto to San Onofre Power Plant) –</b> San Clemente – LONG TWO-SEGMENT TUNNEL; Double Tracking	6	<0.1	2.0	35.5	0	Medium
<b>1.1.1.1.1.4 Stations</b>						
<b>San Clemente Station –</b> parking spaces OR parking spaces/bypass tracks	0	<0.1	25.0	26.5	0	High
<b>1.1.1.1.1.5 Alignments</b>						
<b>Encinitas/Solana Beach Encinitas City Limits To Solana Beach Station –</b> Encinitas – AT-GRADE; Double Tracking; crosses San Elijo Lagoon	4	<0.1	15.5	49.5	0	Medium

	Number of Archaeological Sites	Percentage of Route Developed During Historic Periods			Traditional Cultural Properties (Yes/No)	Overall Ranking (High, Medium, Low)
		<1900	1900-1929	1930-1958		
<b>Encinitas/Solana Beach Encinitas City Limits To Solana Beach Station –</b> Encinitas – SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	4	<0.1	15.5	49.5	0	Medium
<b>Encinitas/Solana Beach Encinitas City Limits To Solana Beach Station –</b> Encinitas – LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	4	<0.1	15.5	49.5	0	Medium
<b>1.1.1.1.1.6 Stations</b>						
<b>Solana Beach Station –</b> parking spaces OR parking spaces/bypass tracks	0	<0.1	2.0	5.5	0	Medium

	Number of Archaeo- logical Sites	Percentage of Route Developed During Historic Periods			Traditional Cultural Properties (Yes/No)	Overall Ranking (High, Medium, Low)
		<1900	1900-1929	1930-1958		
1.1.1.1.1.7 Alignments						
Del Mar Solana Beach Station To Interstate 5 – COVERED TRENCH on bluffs; crosses San Dieguito Lagoon, Los Peñasquitos L	12	<0.1	5.0	25.5	0	High
Del Mar Solana Beach Station To Interstate 5 – TUNNEL under Camino Del Mar; crosses San Dieguito Lagoon, Los Peñasquitos Lagoon	2	<0.1	5.0	25.5	0	High
Del Mar Solana Beach Station To Interstate 5 – TUNNEL along I-5; crosses San Dieguito Lagoon, Los Peñasquitos Lagoon	8	<0.1	5.0	25.5	0	Medium

**TABLE 4-1**  
**Detailed Analysis/Comparison Table**  
**Impacts to Geology/Soils/Seismicity**  
**Los Angeles - Orange County - San Diego**

Table 4-1 provides an overview of the seismic conditions and geologic and soil characteristics found at each of the four locations where screening recommendations have been made. This overview includes the presence along or near the alternative routes of seismic hazards; fault crossings; percent of length of the alternative alignments with slope stability problems, areas of difficult excavation, and crossing through oil or gas fields; and the presence or absence of mineral resources.

	Seismic Hazards (% of Length)	Active Fault Crossings (No. of Crossings)	Slope Stability (% of Length)	Difficult Excavation (% of Length)	Oil and Gas Fields (% of Length)	Mineral Resources (Present, not present)
<b>San Juan Capistrano</b> (City Limits to Avenida Aeropuerto)						
Alignments						
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	75	0	0	10	0	0
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	26	0	0	10	0	0
AT-Grade/Open TRENCH along east side of Trabuco Creek	0	0	76	0	0	0
Stations						
San Juan Capistrano	Present	0	0	0	0	0

	Seismic Hazards (% of Length)	Active Fault Crossings (No. of Crossings)	Slope Stability (% of Length)	Difficult Excavation (% of Length)	Oil and Gas Fields (% of Length)	Mineral Resources (Present, not present)
<b>Dana Point/San Clemente</b> (Avenida Aeropuerto To San Onofre Power Plant)						
Alignments						
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	27	0	76	9	0	0
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	27	0	76	23	0	0
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	0	0	0	14	0	0
San Clemente - LONG ONE-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	0	0	0	50	0	0
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	0	0	0	50	0	0
Stations						
San Clemente	Present	0	0	Present	0	0

	Seismic Hazards (% of Length)	Active Fault Crossings (No. of Crossings)	Slope Stability (% of Length)	Difficult Excavation (% of Length)	Oil and Gas Fields (% of Length)	Mineral Resources (Present, not present)
<b>Encinitas/Solana Beach</b> (Encinitas City Limits to Solana Beach Station)						
Alignments						
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	15	0	4	0	0	0
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	0	0	2	0	0	0
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	21	0	0	0	0	0
Stations						
Solana Beach	Present	0	0	0	0	0
<b>Del Mar</b> (Solana Beach Station to I-5/805 Split)						
Alignments						
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	60	0	21	3	0	0
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	61	0	0	3	0	0
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	25	0	0	4	0	0



**TABLE 4-1**  
**Table 4-2**  
**Detailed Analysis/Comparison Table**  
**Impacts to Visual Resources**  
**(Los Angeles - Orange County - San Diego)**

Table 4-2 notes the potential impacts of the various alignment options on visual resources, including scenic corridors, viewpoints and overlooks, potential for high visual contrasts between the rail option and the surrounding environment, and the degree to which an option might create or increase shadow impacts.

	Scenic Corridors Impacted (miles) <sup>1</sup>	Scenic Viewing Points/Overlooks number within 1/4 miles (#)	High Contrast Impacts (H/M/L)	Shadow Impacts (H/M/L)
<b>San Juan Capistrano</b> (City Limits to Avenida Aeropuerto)				
<b>Alignments</b>				
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	0	0	Low rail would be moved into covered and open trenches but would require new pedestrian overpasses downtown, and fencing along open trench areas	Low pedestrian overpasses would create new shadow effects in downtown area
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	0	0	Beneficial Impact existing tracks would be removed into tunnel; new impacts would occur aqt tunnel portals but would be relatively minor	No Impact
AT-Grade/Open Trench along east side of Trabuco Creek	0	0	Medium New impacts to residential and commercial areas on west side of creek	Low proposed structure widening over San Juan Creek would increase shadow impacts but be consistent with existing environment
<b>Stations</b>				
San Juan Capistrano	0	0	Low proposed improvements to existing station would be consistent with existing environment	No Impact

<sup>1</sup> 1 11 1. There are no designated California State Scenic Routes in the visual resources study area for this project. While the existing LOSSAN rail corridor does provide views of the ocean and open spaces in some portions of its route, the established rail corridor itself is not considered a scenic corridor in the analysis represented in this table.

	<b>Scenic Corridors Impacted (miles)<sup>1</sup></b>	<b>Scenic Viewing Points/Overlooks number within 1/4 miles (#)</b>	<b>High Contrast Impacts (H/M/L)</b>	<b>Shadow Impacts (H/M/L)</b>
<b>Dana Point/San Clemente</b> (Avenida Aeropuerto To San Onofre Power Plant)				
Alignments				
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking	0	0	High covered trench along coastline would reduce visibility of existing rail corridor, but construction along toe of bluffs would require seawalls that would degrade existing viewshed; major construction and transition structures on beach would impact visual environment	No Impact
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking	0	0	High covered trench along coastline would reduce visibility of existing rail corridor, but construction along toe of bluffs would require seawalls that would degrade existing viewshed; major construction on beach would impact visual environment	No Impact
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking	0	0	Beneficial Impact tunnel would remove existing rail along the coast and improve the existing beach aesthetics	No Impact
San Clemente - LONG ONE-SEGMENT TUNNEL; Double Tracking	0	0	Beneficial Impact tunnel would remove existing rail along the coast and improve the existing beach aesthetics	No Impact
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking	0	0	Beneficial Impact tunnel would remove existing rail along the coast and improve the existing beach aesthetics	No Impact

1. There are no designated California State Scenic Routes in the visual resources study area for this project. While the existing LOSSAN rail corridor does provide views of the ocean and open spaces in some portions of its route, the established rail corridor itself is not considered a scenic corridor in the analysis represented in this table.

	Scenic Corridors Impacted (miles) <sup>1</sup>	Scenic Viewing Points/Overlooks number within 1/4 miles (#)	High Contrast Impacts (H/M/L)	Shadow Impacts (H/M/L)
<b>Encinitas/Solana Beach</b> (Encinitas City Limits to Solana Beach Station)				
<b>Alignments</b>				
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	0	0	Low proposed improvements would be consistent with existing environment	Low proposed grade separations and structure widening over lagoons would increase shadow impacts but would be consistent with existing environment
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	0	0	Beneficial Impact covered trench would place existing tracks underground in part of the existing corridor	Low proposed grade separations and structure widening over lagoons would increase shadow impacts but would be consistent with existing environment
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	0	0	Beneficial Impact covered trench would place existing tracks underground in part of the existing corridor	Low structure widening over lagoons would increase shadow impacts but would be consistent with existing environment
Solana Beach	0	0	Low proposed improvements at existing station would be consistent with existing environment	No impact

<sup>1</sup> There are no designated California State Scenic Routes in the visual resources study area for this project. While the existing LOSSAN rail corridor does provide views of the ocean and open spaces in some portions of its route, the established rail corridor itself is not considered a scenic corridor in the analysis represented in this table.

	Scenic Corridors Impacted (miles) <sup>1</sup>	Scenic Viewing Points/Overlooks number within 1/4 miles (#)	High Contrast Impacts (H/M/L)	Shadow Impacts (H/M/L)
<b>Del Mar</b> (Solana Beach Station to I-5/805 Split)				
<b>Alignments</b>				
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	0	0	Medium to High trench option would remove existing tracks on the bluffs into a covered trench, but seawalls and/or tie-back walls may be needed to stabilize bluffs for the long term	Low proposed structure widening over lagoons would increase shadow impacts, but would be consistent with existing environment
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	0	0	Beneficial Impact tunnel option would remove existing tracks from the bluffs and place them underground	Low proposed structure widening over lagoons would increase shadow impacts, but would be consistent with existing environment
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	0	0	Medium tunnel option would remove existing tracks and place underground, but new visual impacts to residential views would result from elevated rail structure south of San Dieguito Lagoon, and from tunnel portal/transition area located between two residential areas	Low tunnel option would remove existing structure across Penasquitos Lagoon, but structure over San Dieguito Lagoon would be widened, and elevated structure across Crest Canyon would add new shadow impacts

1. There are no designated California State Scenic Routes in the visual resources study area for this project. While the existing LOSSAN rail corridor does provide views of the ocean and open spaces in some portions of its route, the established rail corridor itself is not considered a scenic corridor in the analysis represented in this table.

**TABLE 4-3**  
**Detailed Analysis/Comparison Table**  
**Impacts to Land Use, Planned Land Use and Land Use Policy,**  
**Development Patterns, Demographics, Communities and Neighborhoods, Housing & Economics**  
**(Los Angeles-Orange County-San Diego Region)**

As part of the evaluation of land uses, Table 4-3 summarizes compatibility issues for stations and alignments; Environmental Justice factors including the percentage of persons along the alignment option living below the federal Poverty Line (P) and the percent of minority population (M). The table also shows the number of residential housing units within ¼ mile of the alignment, as well as the total non-residential acreage within ¼ mile of the alignment.

	Percent of Residential Acreage <sup>1</sup>	Environmental Justice Impacts (Percent of Population Under Poverty Line)	Environmental Justice Impacts (Percent of Minority Population - Block Group and County)	Number of Residential Units within ¼ mile of Alignment	Non-Residential Acreage within ¼ mile of Alignment
<b>San Juan Capistrano</b> (City Limits to Avenida Aeropuerto)					
<b>Alignments</b>					
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	24.44%	BG = 8.92%; County = 7.74%	BG = 45.18% and County = 48.86%	18,725	368

		Environmental Justice Impacts (Percent of Population Under Poverty Line)	Environmental Justice Impacts (Percent of Minority Population - Block Group and County)	Number of Residential Units within ¼ mile of Alignment	Non-Residential Acreage within ¼ mile of Alignment
	Percent of Residential Acreage <sup>1</sup>				
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	23.95%	BG = 8.92%; County = 7.74%	BG = 45.18% and County = 48.86%	14,120	393
AT-Grade/Open Trench along east side of Trabuco Creek	65.84%	BG = 11.06%; County = 7.74%	BG = 46.71%; County = 48.86%	11,676	101
Stations					
San Juan Capistrano	36.24%	BG = 8.14%; County = 7.74%	BG = 66.13% and County = 48.86%	1,487	8
<b>Dana Point/San Clemente</b> (Avenida Aeropuerto To San Onofre Power Plant)					
Alignments					
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	41.28%	BG = 6.57%; County = 7.74 and 10.34%	BG = 32.88% and County = 48.86 and 45.11%	42,184	340



	Percent of Residential Acreage <sup>1</sup>	Environmental Justice Impacts (Percent of Population Under Poverty Line)	Environmental Justice Impacts (Percent of Minority Population - Block Group and County)	Environmental Justice Impacts	
				Number of Residential Units within ¼ mile of Alignment	Non-Residential Acreage within ¼ mile of Alignment
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	41.28%	BG = 6.57%; County = 7.74 and 10.34%	BG = 32.88% and County = 48.86 and 45.11%	42,184	617
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	38.20%	BG = 6.57%; County = 7.74 and 10.34%	BG = 32.88% and County = 48.86 and 45.11%	45,068	617
San Clemente - LONG ONE-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	42.19%	BG = 6.57%; County = 7.74 and 10.34%	BG = 32.88% and County = 48.86 and 45.11%	50,003	560

	Percent of Residential Acreage <sup>1</sup>	Environmental Justice Impacts (Percent of Population Under Poverty Line)	Environmental Justice Impacts (Percent of Minority Population - Block Group and County)	Number of Residential Units within ¼ mile of Alignment	Non-Residential Acreage within ¼ mile of Alignment
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	42.19%	BG = 6.57%; County = 7.74 and 10.34%	BG = 32.88% and County = 48.86 and 45.11%	50,003	560
<b>Encinitas/Solana Beach</b> (Encinitas City Limits to Solana Beach Station)					
Alignments					
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	54.31%	BG = 6.77%; County = 10.34%	BG = 20.41% and County = 45.11%	12,342	237
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	54.31%	BG = 6.77%; County = 10.34%	BG = 20.41% and County = 45.11%	12,342	237
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	54.31%	BG = 6.77%; County = 10.34%	BG = 20.41% and County = 45.11%	12,342	217

		Environmental Justice Impacts (Percent of Population Under Poverty Line)	Environmental Justice Impacts (Percent of Minority Population - Block Group and County)	Number of Residential Units within ¼ mile of Alignment	Non-Residential Acreage within ¼ mile of Alignment
	Percent of Residential Acreage <sup>1</sup>				
<b>Stations</b>					
Solana Beach	3.03%	BG = 3.55%; County = 10.34%	BG = 12.13% and County = 45.11%	1,609	6
<b>Del Mar</b> (Solana Beach Station to I- 5/805 Split)					
<b>Alignments</b>					
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	21.75%	BG = 6.11%; County = 10.34%	BG = 19.98% and County = 45.11%	16,031	256
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	27.77%	BG = 6.11%; County = 10.34%	BG = 19.98% and County = 45.11%	17,126	255
TUNNEL along I- 5; crosses San Dieguito and Los Penasquitos Lagoons	52.75%	BG = County = 10.34%	BG = 21.56% County = 45.11%	14,228	324

**Note:**

1. Based on a 1/4-mile study area on either side of the rail or highway corridor. Potential property takes would be very limited due to the location of most alignments in or adjacent to the existing LOSSAN rail corridor. See Table 4-1A for information on expected land use impacts of property takes and access/barrier issues.

**Table 4-3A**  
**Potential Land Use Impacts on**  
**Property and Community/Coastal Access**

Table 4-3A summarizes the potential need in each alignment option to acquire land or easement agreements (some underground, for tunnel options), and how the options would affect access issues (such as creation or removal of a barrier between a residential community and a commercial/retail district, or between the coast and other areas.)

<b>CITY SEGMENT</b>	<b>POTENTIAL PROPERTY/EASEMENT ACQUISITION</b>	<b>ACCESS</b>
San Juan Capistrano	<ul style="list-style-type: none"> <li>• Cut/cover option through downtown:               <ul style="list-style-type: none"> <li>◦ Industrial structures/land along San Juan Creek; parking structure and land in downtown area</li> </ul> </li> <li>• Trabuco Creek option:               <ul style="list-style-type: none"> <li>◦ Commercial and industrial structures/land; private high school land; (City may be able to provide land exchanges)</li> </ul> </li> <li>• I-5 tunnel option:               <ul style="list-style-type: none"> <li>◦ Land at portal areas</li> <li>◦ Industrial structures/land along San Juan Creek</li> <li>◦ Commercial/agricultural land at north end of alignment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• All options improve access between the historic residential area of Los Rios and downtown area, however, Trabuco Creek and I-5 tunnel options offer the greatest benefit by completely removing the tracks from the downtown area</li> </ul>
San Clemente	<ul style="list-style-type: none"> <li>• Short trench option:               <ul style="list-style-type: none"> <li>◦ Land south of the pier for new station</li> </ul> </li> <li>• Long trench option:               <ul style="list-style-type: none"> <li>◦ Residential land south of N. El Camino Real</li> <li>◦ Land south of the pier for new station</li> </ul> </li> <li>• Short I-5 tunnel:               <ul style="list-style-type: none"> <li>◦ Commercial/residential land south of Avenida Pico</li> <li>◦ Vacant land at Avenida Pico for new station</li> </ul> </li> <li>• Long I-5 tunnels:               <ul style="list-style-type: none"> <li>◦ Industrial land north of Stonehill Rd (San Juan Capistrano)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• All options would improve access to the Pacific shoreline; however, the short trench option would involve transition structures on the beach, and both trench options would require major construction for an extended time period on the beach. The tunnel options offer the greatest benefit by the completely removing the tracks from the beach</li> </ul>

<b>CITY SEGMENT</b>	<b>POTENTIAL PROPERTY/EASEMENT ACQUISITION</b>	<b>ACCESS</b>
Encinitas	<ul style="list-style-type: none"> <li>• All options: <ul style="list-style-type: none"> <li>◦ Commercial land in the vicinity of Leucadia Blvd and Pacific Coast Hwy</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Short or Long trench option offers the best opportunity for frequent pedestrian crossings connecting commercial and residential land uses</li> </ul>
Del Mar	<ul style="list-style-type: none"> <li>• Trench in bluffs: <ul style="list-style-type: none"> <li>◦ Land in the vicinity of Jimmy Durante Blvd and Camino Del Mar</li> </ul> </li> <li>• Camino Del Mar tunnel: <ul style="list-style-type: none"> <li>◦ Vacant land in the vicinity of Torrey Pines Rd and LOSSAN Corridor</li> </ul> </li> <li>• Penasquitos Lagoon bypass tunnel: <ul style="list-style-type: none"> <li>◦ Industrial land along Sorrento Valley Rd</li> <li>◦ Residential land along south side of San Diequito Lagoon</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Camino Del Mar tunnel and Penasquitos Lagoon bypass options improve access to the shoreline by completely removing the tracks from the bluffs</li> </ul>

# **APPENDIX B - ANALYSIS OF INLAND BYPASS ALTERNATIVE**



## 1.0 INTRODUCTION

- The July, 2001 "High-Speed Train Alignments/Stations Screening Evaluation" report evaluated several alignment alternatives in south Orange County, among them two alternatives that would bypass sensitive beachside and historic areas in San Juan Capistrano (SJC), Dana Point (DP) and San Clemente (SC).
- The two alternatives were the SR-241 alignment (alternative C4), and a high level of improvement of the LOSSAN corridor (alternative C1b or the LOSSAN-b alternative) that features bypass tunnels along I-5 in SJC, DP and SC
- Based on the evaluation in the July Report and on comments received from the public and affected agencies, the September, 2001 "Draft First Screening Report" recommended that the SR-241 alternative be dropped from further consideration
- Since then, requests have been received to provide greater information about the analysis that led to this conclusion. This memo draws on the July 2001 analysis, and provides supplemental observations based on the data. As the report also recommends retaining the LOSSAN alternative featuring the bypass tunnels, the evaluation is presented as a comparison of the two alternatives.

## 2.0 ADVANTAGES OF THE SR-241 ALIGNMENT

- Completely bypasses sensitive areas in SJC, DP and SC
- Allows electrified, dedicated system to extend to Oceanside - transferless from Oceanside; more reliable operations
- Possibilities for joint design/construction with SR-241 extension - potential for cost savings
- As a dedicated high-speed rail corridor with 3.5% gradient options, requires less tunneling than I-5 bypass, thereby avoiding the inherent uncertainties and potential problems of a tunneling solution
- Avoids need for s-curve when transitioning from LOSSAN corridor to I-5 short tunnel option, with its attendant speed restrictions
- Along with the I-5 alternative, provides a second alternative to expanding the LOSSAN corridor along its present right-of-way

## 3.0 DISADVANTAGES OF THE SR-241 ALIGNMENT

### Engineering

- Topography of both the existing and proposed extension of the SR-241 corridor is rolling, with several 3%-5% grades, and many canyon, water course and wildlife corridor crossings – this requires extensive aerial structures to negotiate
- Being a new alignment, significantly more work is required relative to upgrading the existing LOSSAN alignment

## Environmental and Community Impacts

- Environmental sensitivities in the SR-241 corridor (can reference Section 4.0)
- Community impacts - the existing LOSSAN corridor between the Irvine Transportation Center and SJC generally runs parallel to I-5 in a corridor that is predominately commercial and light-industrial, with pockets of residential communities through Mission Viejo. In contrast, the existing SR-241 corridor is predominately flanked by residential communities and open space, as will be the southern extension
- Transition from LOSSAN to SR-241 at Irvine - as studied, the alignment transitions from the I-5/LOSSAN corridor in southern Irvine over to the SR-241 corridor by following the SR-133 Toll Corridor. As the I-5/LOSSAN/SR-133 junction occurs north of the existing Irvine Transportation Center, this would require either a separate HSR station, or the relocation of the ITC north to the vicinity of Jeffrey Road, which is largely residential. The City of Irvine is on record as opposed to any relocation of the ITC. An alternative would be to transition over to SR-241 south of the ITC along the southern edge of the El Toro site. This was briefly examined, but felt to be highly problematic. There are three basic options, two of which involve using arterial corridors (Alton Parkway and Bake Parkway) that are meandering and largely developed on either side. The third option involves directly traversing the El Toro property, which could be challenging with the current plan of a large urban park.

## Ridership

- Due to length and terrain, the SR-241 routes would have longer travel times than the LOSSAN route - 37 min from Oceanside to Anaheim, vs. 34 minutes.
- The Authority adopted recommendation to eliminate a dedicated high-speed connection through coastal San Diego further erodes the benefits for a dedicated connection through south Orange County - the ridership benefits of extending a dedicated high-speed system to Oceanside (i.e. without being able to penetrate further into San Diego County) are marginal

## Dedicated vs. Shared-Use

- The SR-241 alternative was configured and studied as a dedicated electrified high-speed rail corridor that would not share track with any of the existing services in the LOSSAN corridor.
- If corridor is shared with other passenger services - Amtrak/Metrolink - impact to service at stations in Irvine, Laguna Niguel, San Juan Capistrano and San Clemente Pier - stations would be deleted, or relocated inland to the SR-241 corridor, which would not be as accessible to most residents of Irvine, Lake Forest, Laguna Hills, Laguna Beach, Laguna Niguel, Dana Point, San Juan Capistrano and San Clemente, likely causing ridership on Amtrak and/or Metrolink to suffer: it is questionable whether either entity would split service.
- If corridor is shared with BNSF Freight Service - SR-241 was studied as a dedicated passenger high-speed rail system, using maximum grades appropriate for passenger-only systems (3.5% max. sustained, up to 5% tolerable for short segments). The SR-241 alignment has several grades in the 3-5% range, most of which could be negotiated with structures for a passenger-only system. If the line were to be reconfigured for freight, which requires a maximum 1.2% sustained grade, the line would require extensive tunneling, far beyond the 14 miles of tunnel contained in the LOSSAN alternative. A preliminary assessment indicates that the extent of tunneling could be between 20 and 30 miles. The unit-cost and extent of tunneling could be lower, due to the relative openness of the corridor relative to I-5 in SJC and SC, and the possibility of joint-design

and construction with the SR-241 toll road extension. However, the sheer length of required tunneling would cause the total cost for the SR-241 alternative to be much higher than the LOSSAN alternative with bypass tunnels.

## **4.0 SUMMARY OF TECHNICAL DATA FROM SCREENING EVALUATION**

The following technical data was taken directly from the July 2001 Screening Evaluation Report put out by the California High Speed Rail Authority, and relates directly to the alignment alternative traversing the proposed State Route 241 Toll Corridor in southern Orange County.

### **OPERATIONAL ISSUES**

This option follows the alignments of SR-241 and I-5, and has the longest distance and the second longest trip times. Due to moderately steep grades along the existing and proposed SR-241 alignment, this option would only be suitable for dedicated VHS or maglev operation.

### **CONSTRUCTION ISSUES**

Between Irvine and San Onofre this alignment would follow the SR-241 toll road, which has a rolling profile, requiring a tunnel section near Arroyo Trabuco. South of Oso Parkway, the alignment follows the proposed "Far East" alignment alternatives for SR-241; the highway does not yet exist south of Oso Parkway. In this section, the alignment crosses several canyons and rivers, requiring long-span aerial construction. If the SR-241 were not built along the "Far East" alignment, the construction of this option would include substantial earthwork between Oso Parkway and San Onofre, which would otherwise be accomplished by the highway construction. Assuming that the SR-241 does follow this alignment, this option would have fewer construction issues than both the long split tunnel and short tunnel options in San Clemente.

### **CAPITAL COST**

This option is estimated to have a very high capital cost due to long stretches of aerial construction and tunneling with rolling profile.

### **LAND USE COMPATIBILITY AND CONFLICTS**

The proposed alignment follows a toll highway through agricultural lands west of MCAS El Toro (closed). Large tracts of residential development occur in the cities of Lake Forest, Mission Viejo and Rancho Santa Margarita. The portion of SR-241 between Antonio Parkway and Oso Parkway is open space/preserve and is largely undeveloped immediately adjacent to the toll road. South of Oso Parkway, the option follows the proposed toll road alignment through largely undeveloped land. The alignment passes west of the General Thomas F. Riley Wilderness Park and just east of the Rancho Mission Viejo Ecological Reserve. Land uses in San Diego County are largely open space and recreational.

### **VISUAL QUALITY IMPACTS**

The northern portion of this option is located within the suburban residential and office areas of Tustin and Irvine. The alignment transitions to suburban residential development and then into undeveloped areas of rolling hills with natural vegetation to the south. The alignment option would have minor to significant visual impacts to the surrounding communities because the majority of the alignment option would be aerial on existing freeway alignments, along with open space in southern Orange County. Alignment portions of Camp Pendleton would be at-grade with a small portion being trenched. No communities or neighborhoods would be adversely divided by the proposed alignment option.

### **WETLAND RESOURCES**

There are 24 wetland and riparian areas that are known to occur within this option. These include the SARC, Santiago Creek, El Modena Irvine Channel, Peters Canyon Wash, Borrego Canyon Wash, San Diego Creek, Aliso Creek, Oso Creek, Trabuco Creek, San Juan Creek, San Mateo Creek, San Onofre Creek, Horno Canyon Creek, Las Pulgas Canyon Creek, Santa Margarita River, and the San Luis Rey River, Upper Oso Reservoir, Trabuco Creek, Tijeras Canyon Creek, San Juan Lakes, Christianitos Creek, San Mateo Creek, and San Onofre Creek.

## **WATER RESOURCES**

Major surface water resources crossed by this alignment option include the Santa Ana, Santa Margarita, and San Luis Rey Rivers. Other water resources crossed include 12 creeks: Fullerton, Carbon, Crescent, Santiago, San Diego, Aliso, Oso, Trabuco, San Mateo, San Onofre, Horno Canyon, Tijeras Canyon, Christianitos, San Mateo and Las Pulgas Canyon. Additional water resources crossed include the El Modena Irvine Channel, San Juan Lakes, Upper Oso Reservoir and Peters Canyon Wash.

## **FLOODPLAIN IMPACTS**

SR-241 crosses numerous 100-year floodplain zones and is associated with unnamed drainages, tributaries and small creeks. Major floodplains crossed include a number of 100-year floodplain zones that are crossed in south Orange County that vary in size from 100 to 5,000 feet along I-5 corridor including Trabuco and San Juan Creeks.

## **THREATENED & ENDANGERED SPECIES IMPACTS**

The following 21 threatened and endangered species and species of special concern are known to occur within this alignment option along the SR-241:

- Coastal Cactus Wren (Species of Special Concern)
- Coastal California Gnatcatcher (Threatened: Federal listing)
- Western Spadefoot (Species of Special Concern)
- Orange-Throated Whiptail (Species of Special Concern)
- Riverside Fairy Shrimp (Endangered: Federal listing)
- San Diego Horned Lizard (Species of Special Concern)
- Southern Sycamore Alder Riparian Habitat (Species of Special Concern)
- Valley Needle Grass Grassland (Species of Special Concern)
- Pallid Bat (Species of Special Concern)
- Southern Mixed Riparian Forest (Species of Special Concern)
- Long-Eared Owl (Species of Special Concern)
- Southern Cottonwood Willow Riparian Woodland (Species of Special Concern)
- Southern Tarplant (Species of Special Concern)
- Many-Stemmed Dudleya (Species of Special Concern)
- Arroyo Chub (Species of Special Concern)
- Payson's Jewel-Flower (Species of Special Concern)
- Arroyo Toad (Endangered: Federal listing)
- Thread-Leaved Brodiaea (Threatened: Federal, Endangered: State listing)
- Tidewater Goby (Endangered: Federal listing)

- Least Bell's Vireo (Endangered: Federal and State listing)
- Southern Foredunes (Species of Special Concern)

## **ENVIRONMENTAL JUSTICE IMPACTS (DEMOGRAPHICS)**

Minority populations that are potentially affected by this option were identified in several 1990 Census block groups in an unincorporated portion of Orange County. The minority population potentially affected within these block groups was estimated to be approximately 50 people. No low-income households were identified in the cities along this alignment option.

## **COMMUNITY & NEIGHBORHOOD IMPACTS**

From Irvine, this alignment follows SR-133 north and intersects SR-241 north of MCAS El Toro. The alignment continues through the cities of Lake Forest, Mission Viejo, Rancho Santa Margarita, and O'Neill Regional Park. The portion of SR-241 between Antonio Parkway and Oso Parkway is open space/preserve and is largely undeveloped immediately adjacent to the toll road. From the intersection with Oso Parkway the alignment continues along the proposed continuation of the SR-241. It traverses largely undeveloped land within the Orange County including Rancho Trabuco and Rancho Mission Viejo. The alignment passes west of the General Thomas F. Riley Wilderness Park, crosses SR-74, and passes just east of the Rancho Mission Viejo Ecological Reserve. It enters the County of San Diego just past Avenida Pico. This portion of the alignment traverses through San Onofre State Beach west of U.S. Marine Corps Base Camp Pendleton. The proposed SR-241 alignment terminates at the I-5/Basilone Road interchange, near San Onofre. This option would not cause any new physical barriers or divisions within the communities and neighborhoods listed because the alignment would follow existing or proposed transportation corridors.

If the SR-241 did not follow the "Far East" alignment alternative, this option would cross through open space planned for residential development, and could potentially form a barrier.

## **FARMLAND IMPACTS**

From the current terminus of SR-241 at Oso Parkway south to SR-74 there are scattered parcels of prime and unique farmlands and farmlands of statewide importance. From SR-74 south to San Onofre there are parcels of prime farmlands and farmlands of statewide importance located south of Christianitos Road in unincorporated San Diego County. Farmland impacts would be the same as Option C2, from Anaheim to Irvine and San Onofre to Oceanside.

## **PARKS & RECREATION/WILDLIFE REFUGE IMPACTS**

The following two parks and recreation resources are known to occur within or along this option.

- O'Neill Regional Park
- San Onofre State Beach

## **SOILS/SLOPES CONSTRAINTS**

Throughout southern Orange County, all the alignments traverse areas subject to liquefaction and earthquake induced slides. The liquefaction zone extends eastward into the Cleveland National Forest.

Portions of this option south of the existing SR-241 terminus would be subject to slides and liquefaction in areas of cut slopes.

# **APPENDIX C - EXHIBITS USED IN SCREENING OF OPTIONS IN KEY LOCATIONS**

The following Appendix contains copies of the exhibits used in the screening of options in key locations along the LOSSAN corridor, and discussed in Section 6.



## **APPENDIX D - CORRESPONDENCE**

The following is the text of an email from U.S. Fish and Wildlife Service sent to the Department's LOSSAN Project Manager on May 05, 2003 (formatted for improved readability)

Please see comments from Fish & Wildlife on the screening report and on the inland bypass corridor.

Thank you.

Arturo Jacobo  
Project Manager  
California Department of Transportation  
2829 Juan Street, MS 27  
San Diego Ca, 92110  
Tel. (619) 688-6816  
Fax (619) 688-3217  
----- Forwarded by Arturo Jacobo/D11/Caltrans/CAGov on 05/05/03 08:58 AM

Arturo,

The Service does not support any inland route in Orange County. The following are the Service's main points regarding the inland route in Orange County:

The rail routes proposed are parallel to the Southern Orange County Transportation Infrastructure Improvement Project alternatives along only the built/tolled alignments, plus connections to/through the area north of Rancho Mission Viejo. Any of these routes may have adverse effects to listed and sensitive species in the project area and may negatively impact habitat reserve design that is currently in planning under the Southern Subregion of Orange County Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) processes. In particular, an inland route through Chiquita Canyon would directly impact and fragment a core coastal California gnatcatcher population. Also, because the rail corridor could not stay with any of the proposed toll road alignments due to engineering geometrics, there would be increased fragmentation of habitat for numerous species.

Listed/proposed species known in the railroad project area include:  
coastal California gnatcatcher (*Polioptila californica californica*)  
least Bell's vireo (*Vireo bellii pusillus*)  
southwestern willow flycatcher (*Empidonax traillii extimus*)  
western snowy plover (*Charadrius alexandrinus nivosus*)  
Riverside fairy shrimp (*Streptocephalus woottoni*)  
San Diego fairy shrimp (*Branchinecta sandiegonensis*)  
arroyo toad (*Bufo californicus*)  
pacific pocket mouse (*Perognathus longimembris pacificus*)  
southern steelhead (*Oncorhynchus mykiss*)  
tidewater goby (*Eucuclogobius newberryi*)  
thread-leaved brodiaea (*Brodiaea filifolia*)

Listed/proposed species that may occur in the project area include:  
light-footed clapper rail (*Rallus longirostris levipes*)

California least tern (*Sterna antillarum browni*)  
brown pelican (*Pelecanus occidentalis*)  
mountain plover (*Charadrius montanus*)  
yellow-billed cuckoo (*Coccyzus americanus*)

Other sensitive species that the Science Advisors identified as effective "umbrella species" for consideration in the NCCP/HCP and SAMP/MSAA processes include:

American badger (*Taxidea taxus*)  
bobcat (*Lynx rufus*)  
coyote (*Canis latrans*)  
mountain lion (*Felis concolor*)  
red-tailed hawk (*Buteo jamaicensis*)  
great horned owl (*Bubo virginianus*)  
golden eagle (*Aquila chrysaetos*)  
barn owl (*Tyto alba*)

The following plant species are being considered in regional planning efforts:

intermediate mariposa lily (*Calochortus weedii intermedius*)  
many-stemmed dudleya (*Dudleya multicaulis*)  
southern tarplant (*Centromadia parryi australis*)  
Coulter's saltbush (*Atriplex coulteri*)

The Science Advisors considered another approximately 60 animal species and 23 plant species as Group 2 and 3 species that may be best conserved by either protecting habitats at a landscape level or at the species level. Most of these species and those noted above will receive some level of review and consideration during planning of an effective habitat reserve design under the NCCP/HCP and SAMP/MSAA processes. Rail alignments that cross reserve areas may directly impact species in the path of the alignment and fragment the reserve thereby reducing its capability to conserve target species. Actual effects to any particular species would obviously depend on the particular alignment, ecology and biology of that species, and the specific habitat reserve design.

Given the number of federally listed species (there may be more State listed species to consider as well), sensitive species and habitat reserve design issues, we suggest that other rail options be considered, such as double-tracking of the existing rail line, rather than pursuing a new alignment through a very sensitive portion of Orange County.

Thanks

John DiGregoria  
Fish and Wildlife Biologist  
Carlsbad Fish and Wildlife Office  
6010 Hidden Valley Road  
Carlsbad, California 92009  
760 431-9440  
fax 431-5902  
John\_DiGregoria@r1.fws.gov